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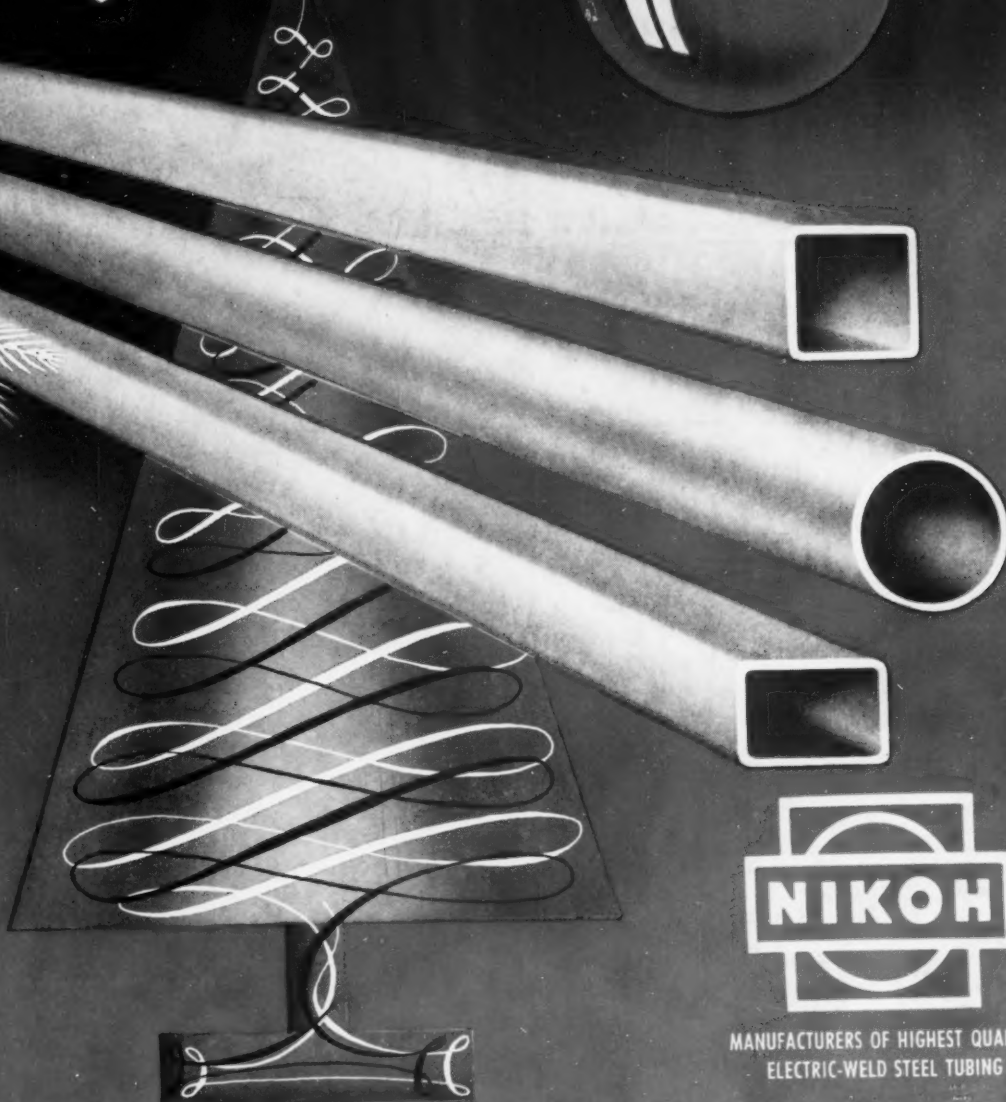
LAST ENGINEERING

December 17, 1953

NATIONAL METALWORKING WEEKLY

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Merry Christmas
And a
Happy New Year



MANUFACTURERS OF HIGHEST QUALITY
ELECTRIC-WELD STEEL TUBING

NIKOH TUBE COMPANY

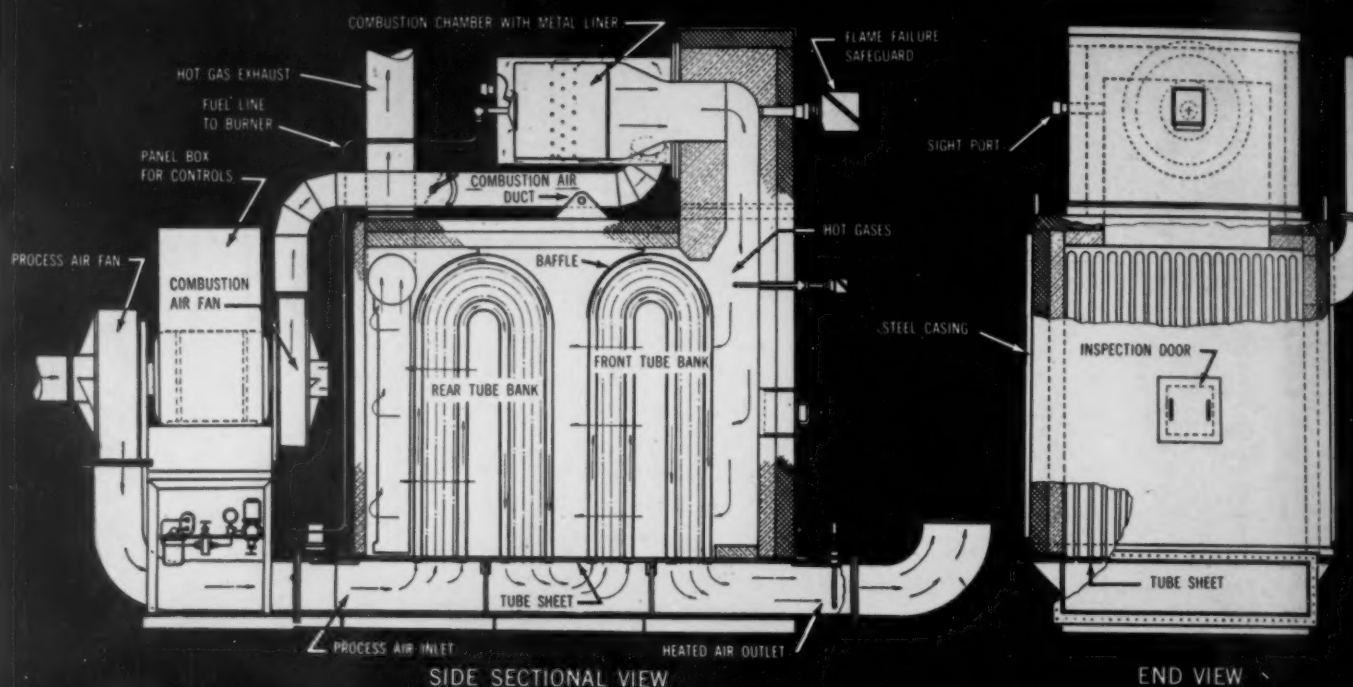
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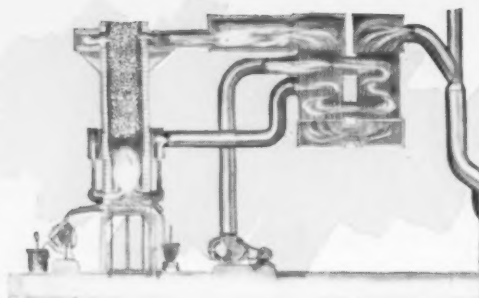
**FOUND
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EQUIPMENT**

USE HOT BLAST

for hotter iron with less coke!



Todd-Thermo Process . . . Oil or gas is used to preheat the blast. Particularly useful for short heats, since preheated air is available right from the beginning of the heat.



Griffin Hot Blast System . . . Incompletely burned gas from the stack of the cupola is used to preheat the air.

Pre-heat the cupola air supply and get hotter iron and reduced coke consumption! With a Whiting Hot Blast System you obtain a higher melt temperature which produces hot, fluid metal . . . a higher percentage of good castings with close, even grain . . . closer metallurgical control of the melt and an hourly melting rate increase of as much as 15%. Since proportionately less coke is used the sulphur pickup decreases and the faster melting rate means less oxidation. This permits you to use more *scrap* iron—less *pig* iron!

You have a choice of two Whiting Systems to pre-heat the air. The Todd-Thermo externally fired heater is a compact, high efficiency unit employing a single burner. The Griffin system, a recuperative method, uses partially burned gases from the stack. Each method has certain advantages for particular situations, and a Whiting foundry engineer will help you choose the system that is best for your requirements.

WHITING CORPORATION
15601 Lathrop Avenue, Harvey, Illinois

Write today!
Ask for Bulletin FO-3. It gives
complete information on the
advantages of hot blast.





FLANGED-AND-DISHED HEADS Bethlehem spins or presses eight different types of Heads—flanged-only, elliptical, tank-car, obround-tank, double-dished, standard, shallow and ASME Code flanged-and-dished. Diameters of Bethlehem Heads range up to 144 in.; thicknesses range from $\frac{1}{8}$ in. to $3\frac{1}{2}$ in. We also produce a full line of standard manholes and covers, hand holes and covers, flue holes, collar flanges and pipe flanges. Tell us about your requirements, regardless of quantity. Please write direct to Bethlehem Steel Company, Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



*Starred items are digested at the right.

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NEWS DEVELOPMENTS

"I WORKED IN A RED MACHINE TOOL PLANT"—P. 71

An Austrian POW engineer tells THE IRON AGE secrets of the Soviet machine tool industry. He reveals Russians are using a lot of lend-lease machinery we gave them in World War II and tells how Reds are able to steal designs of our latest types of machinery. He searched Communist files for tool production figures.

TITANIUM LOCKNUTS TRIM PLANE WEIGHT — P. 73

Weight savings of up to a ton are seen possible by use of titanium fasteners in a fighter plane. Actual saving would be about 213 lb in the fasteners, the rest in other structural parts which wouldn't have to carry as heavy a load. Elastic stop Nut Corp. of America is now selling titanium locknuts.

WHAT ARE FARM EQUIPMENT PROSPECTS? — P. 74

IRON AGE asked this question of John L. McCaffrey, president of International Harvester. In this exclusive interview he answers that the present dip will continue into '54. But new products, hard selling, need for labor-saving devices will fortify future demand, build long-term strength.

COMPUTER ANSWERS INDUSTRY'S QUESTIONS — P. 78

Cooperative effort and expenditure by business and Wayne University combined to give Detroit an electronic computer. Only one of its kind in the Midwest and only non-government supported large-scale computation center in the country, it will help solve problems for business and industry on a fee basis.

SALES RACE REVIVES STYLING-POWER FEUD — P. 88

Which means more in the sales column, engine or styling? This long-standing auto industry argument will get new data from the Ford-Chevy race. Neither will have a new body but Ford's is a year older than Chevy's. Ford's ace is a new engine while Chevrolet has only souped up the old one.

PUSH SALE OF FEDERALLY OWNED BUSINESS—P. 93

Congress plans to curb government competition with private enterprise. Cash tieup totals \$30.5 billion worth of federally held financial and industrial enterprises. Sale could balance the budget and pave the way to widespread tax reduction and retirement of part of the \$275 billion public debt.

the Week in Metalworking

ENGINEERING & PRODUCTION

NEW MILL INDUCTION WELDS ALUMINUM PIPE—P. 129
Aluminum irrigation tubing is being produced faster, and at lower cost, on a new high speed Yoder cold forming mill. Coiled strip is turned into 4-in. tubing at 62 fpm. Cost of this induction welded tubing is below that of extruded material of similar quality. Wall thickness is uniform, surface finer.

SCRAP PREPARATION AIDS STEEL QUALITY—P. 132
Cooperation of dealers and consumers to prepare and segregate purchased scrap will pay off in better steel and cost savings. Dealers and purchasers tour each other's operations, see problems at first hand. Marking system identifies scrap source. Plan has considerably improved bundles and miscellaneous scrap.

DESCALE TITANIUM WITH SODIUM HYDRIDE—P. 137
Oxide scale on hot rolled titanium is successfully removed in a sodium hydride bath. Danger of hydrogen embrittlement is eliminated at low bath operating temperatures, 680° to 720°F. Odorless, fumeless treatment means virtually no pollution problem. Sludge pans remove reduced material occasionally.

HELP FROM QUENCHING-DISTORTION TESTS—P. 140
Residual stresses induced by heat treatment can prolong fatigue life, can also cause warpage. To determine what steels and heat treatments should be used to hold distortion to a minimum, Battelle Memorial Institute developed a quenching-distortion test. Tests also helped explain distortion mechanism.

IMPROVED GRINDING OF TITANIUM CARBIDES—P. 144
Diamond wheels are recommended, but silicon carbides may be used if wheel speeds are kept in 3500 to 4000 sfpm range. Use plenty of coolant for wet grinding. Specially designed wheels are best when parts must be ground dry, but avoid dry grinding wherever possible. Large diameter wheels aid economy.

NEXT WEEK—LOW FREQUENCY INDUCTION HEATING
Use of low frequency induction heating equipment for ferrous and nonferrous applications is growing. A big advantage is low first cost of equipment. Penetration of heat energy is greater than with high frequency heating. The 3-phase heater draws a balanced load from the electrical circuit.

MARKETS & PRICES

FOUNDRIY SALES OFF, '54 OUTLOOK FAIR — P. 77
Traditionally slow in the fourth quarter, foundries on 3-day workweeks are becoming more prevalent. Inventory shakedowns and tapering demand are the reasons. Total volume for the year won't be far from the '52 total. Based on optimism from auto and tool builders, '54 outlook is fairly good.

STEEL'S SELLING BURDEN GROWING HEAVIER — P. 83
Freight absorption has buried steel producers under a mass of detail rivaling government controls' red tape. And other problems of a more competitive market are compounding the burden. Supplier-customer relationships have also undergone drastic revision. Buyers are asking and getting more concessions.

TINY TRACTOR AIMS AT SUBURBAN SALES—P. 84
Hoping to interest the Sundown Farmer (white collar man with land), Sears Roebuck is planning to mail-order and retail a midget tractor for \$598. A one-cylinder 6.5-hp engine powers the 895-lb tricycle tractor which comes with a variety of attachments. Tri-Trac is the name of the backyard mite.

INVENTORY VALUE NEARS STABLE POINT — P. 101
On a year-long uptrend, value of industry inventory now shows signs of stabilizing, and perhaps more definitely reversing direction in months ahead. So far, momentum of our expanded productive plant has buoyed up inventory contrary to the readjustment ebb in activity, sales, new order rates, backlogs.

FEBRUARY ORDERS CHEER STEELMAKERS — P. 153
Two of the Big Three of the auto industry have started placing February orders for steel. The auto industry is a source of both joy and gloom to steelmakers. While two auto companies are backing big production talk with orders, others are still sweating under inventory burdens. Next 2 or 3 weeks will tell plenty.

TIN TALKS SET UP MARKET CONTROL PLAN — P. 156
Geneva conference approved 25,000-ton buffer stock of tin. Price floor and ceiling of 80¢ and \$1.10 per lb to stabilize tin market must still be ratified by producing and consuming countries. Under vote setup, U. S. approval is not needed but Bolivia, Malaya and Indonesia must sign for pact acceptance.

Mt. Vernon Die Casting Corp., says...

"We highly Recommend"...

AJAX

Induction Furnaces -



Two views of AJAX Furnaces installed at the new Stamford, Conn., plant of Mt. Vernon Die Casting Corp. Photo at left shows two 166 kW furnaces in foreground for melting aluminum, and in background two 20 kW and five 20 kW furnaces for melting zinc. The zinc die casting machines are shown in right rear.

Upper photo shows another view of the 166 kW furnaces, with control cabinets in the background.

After a most satisfactory experience of more than five years with AJAX *low frequency* Induction Furnaces in their Mt. Vernon, New York plant, this company has now installed the furnaces shown above in their new modern plant at Stamford, Conn. "We are convinced," they state, "that economy of operation makes this type of furnace well worth while. We intend to continue to install them till all our die casting machines are fed by AJAX furnaces."

AJAX induction melting and holding furnaces are finding wide acceptance in the American die casting industry. Experience has shown that they greatly improve the overall performance. In particular, the absence of fumes and reduction of radiant heat give greater comfort to the operators. Electricity is one of the few commodities which have not increased in price in recent years.

Agitation, due to internal electrical stirring, insures uniform temperature and homogeneous mixing of the in-

gredients. Since linings are made of inert refractories, they cannot contaminate the melt. Temperature control is entirely automatic and keeps the molten mass within $\pm 5^\circ\text{F.}$, holding the metal at the lowest feasible casting temperature.

Amazingly low maintenance is the rule. Some furnaces operate for as long as 7 years without renewal of refractory lining. Rejects and metal losses are extremely low.

AJAX

TAMA-WYATT



AJAX ENGINEERING CORP., TRENTON 7, N. J.

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Mullgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

THE IRON AGE

Editorial, Advertising and Circulation
Offices, 100 E. 42nd St., N. Y. 17, N. Y.
Oxford 7-3400

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Editorial

The Iron Age

FOUNDED 1855

The Fairless-McDonald Tours

CURRENTLY Ben Fairless, U. S. Steel board chairman, and Dave McDonald, steel union president, are touring the U. S. Steel plants. Newspaper men and photographers have been barred from visits in order to prevent a three ring circus aspect.

Both Mr. Fairless and Mr. McDonald have a big stake in the success of these good will tours. There should be benefits for both—but there are pitfalls for both too. The benefits could stem from a better understanding by local plant management and local union people of the problems of the union and the company. Local troubles in the past have often branched into a five-alarm fire.

The difficulties could come from a dim view taken by other steel heads on the U. S. Steel tours. Such views which have been given privately in a few cases come from a misunderstanding of just what Mr. Fairless is trying to do. For Mr. McDonald they could come from a rank and file opinion—and other CIO gossip—that Dave was doing too much hobnobbing with the big wheels. He has been president of the steel union for only a short time so he has to give some thought to his public actions.

But both Mr. Fairless and Mr. McDonald took a calculated risk when they decided to expand the aims of the meetings which were planned by Mr. Fairless and the late Phil Murray. Both know that many motives will be ascribed to the tours and meetings. But the truth of the matter is so simple that many will not believe it. Mr. Fairless for years has felt that there was too much fire and brimstone in union-management relations. He wanted to do something about it just as he did something about U. S. Steel's ore, products, pricing and executive training. Labor is his last milestone as head of U. S. Steel before he retires. It is as simple as that.

Dave McDonald was at the side of Mr. Murray since the early thirties. He knows what strife can do and what misunderstandings can do. He too wants to cut down on the fires at the plant level. He took the chance of criticism from rank and file—and CIO officials as well—believing that the good which would come would outweigh any damage to his increasing prestige.

Neither man thinks good will comes over night. They think a year from now may tell. Nor does either think that the visits today will mean any softer attitude when the contract openings come. The 1954 negotiations will be rough—but with a shade less bitterness.

Tom Campbell

Editor

December 17, 1953



■ Tracer-light photo made with flashlights attached to fork tips, showing range of handling motions with the Baker "Octopus."



This BAKER TRUCK handles any shape load ... *and stacks it in any position!*

■ You name the load—the Baker "Octopus" illustrated will handle it, whether it's a drum, a roll of newsprint, a packing case, a piece of machinery, a bale of cotton or a pallet load of cartons. Moreover, it will pick it up, transport it, raise or lower it, shift it to left or right, revolve it, up-end it, or stack it in any position. In fact, it will handle it with no more physical effort than is needed to operate the simple hydraulic controls.

The "Octopus" consists of a standard Baker Fork Truck equipped with a variety of Baker attachments—360° revolving head, 4-purpose carriage, up-ender, drum clamp, etc.—which may be applied individually or in combinations. While one truck may never be called on to perform all these functions, the "Octopus" demonstrates the range of utility of Baker fork trucks and attachments.

Baker

industrial trucks

write for

6-page special report on the application of Baker attachments to various loads.

THE BAKER-RAULANG COMPANY
1227 WEST 80TH STREET • CLEVELAND 2, OHIO

BAKER-LULL Corporation, Subsidiary, Minneapolis, Minn.
Material Handling and Construction Equipment.

Dear Editor:

Letters from readers

Technical Help Needed

Sir:

For a considerable period of time we have been regular subscribers of your publication and wish to congratulate you on the many interesting topics you discuss. Some time ago you informed your readers to submit for discussion any technical problem which might be solved by another reader. Here is a special problem which we would like to have solved:

We intend to color stainless steel wire corresponding with type 302 with blue, red, green color a.s.o. for a special purpose without affecting the tensile strength of the material in question. The main problem is that the material in question has to be supplied in thin sizes (approx. 0.30 mm diam) with a tensile strength of approximately 170-180 kg/mm² (approx. 240,000-255,000 psi).

We hope someone can help us in overcoming the difficulty of coloring the above stainless steel wires.

E. RONNER

Stahlwerk Kabel
C. Poupier, Jr., GMBH
Hagen-Kabel/Westf.
Germany

Shrink Fits

Sir:

Please send us a reprint of the article entitled "Shrink Fits: Holding Power Can Be Increased" which appeared in the Nov. 12 issue of THE IRON AGE.

H. L. ANDERSON
Supervisor
Quality Control Lab.

Dearborn General Mfg. Div.
Ford Motor Co.
Dearborn, Mich.

Plastic Pipe

Sir:

Kindly forward to me a tear sheet of the Special Report entitled "Plastic Pipe: Less Fanfare, More Sales" by R. M. Lorz which appeared in the issue of Nov. 19.

J. M. DAVIS
Buyer

Lukens Steel Co.
Coatesville, Pa.

Machining Titanium

Sir:

Would you kindly send us a tear sheet of your article "How to Machine Titanium" which appeared in your April 17, 1953 issue and was written by D. C. Goldberg and W. S. Hazelton?

At Super Steel Products Co. we appreciate reading your magazine which is circulated not only in the office but also in the factory.

A. J. PIOT
Sales Engineer

Super Steel Products Co.
Milwaukee, Wis.

Together We Stand

Sir:

I always enjoy reading your editorials in IRON AGE and I particularly liked the one which was in the Nov. 5 issue entitled "We Are All In This Together."

We would like very much to run this editorial in an early issue of our employee publication and are asking for your permission.

W. H. SCHAFER
Advertising Manager

The Cold Metal Products Co.
Youngstown 1, Ohio

Favorable Stress Patterns

Sir:

I would very much appreciate receiving tear sheets of the article entitled "How to Develop Favorable Stress Patterns," Parts I and II, which appeared in the Nov. 12th and 26th issues respectively.

J. M. LOIACONO
Chief Metallurgical Engr.

Eclipse-Pioneer Div.
Bendix Aviation Corp.
Teterboro, N. J.

Tear sheets of Part I, II, and III are now available. Part III of this article appears in the technical section.

Boron Steels

Sir:

Will you please send us six tear sheets of the article appearing in the Oct. 29 issue of THE IRON AGE entitled "How Do Boron Steels Compare in Machinability?"

E. C. PIERCE

Climax Molybdenum Co. of Michigan
Detroit

Longer Drill Life

Sir:

We are interested in an article entitled "Retractable Bushings Increase Output, Extend Drill Life" which appeared in your issue of Nov. 12, p. 78.

We would appreciate receiving a tear sheet of this article.

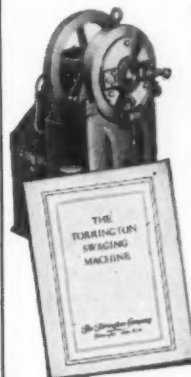
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Buyer

Ex-Cell-O Corp.
Detroit, Mich.



need a better finish?

Torrington Swaging Machines — delivering 4000 hammer blows a minute — work out surface imperfections quickly... produce a finish far superior to that obtained by other reduction methods. Swaging improves the quality of the material, too, and utilizes every ounce of stock.



"The Torrington Swaging Machine" describes all the advantages of swaging and gives full details on all Torrington machines. A copy is yours for the asking.

THE TORRINGTON COMPANY

Swager Department
555 Field Street • Torrington, Conn.

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TORRINGTON NEEDLE BEARINGS

Radiant Gas Heat is

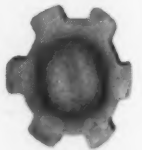
6

TIMES FASTER

for Hardening Shafts

SELAS *ihp CUTS UNIT
COST 70%...ELIMINATES
STRAIGHTENING...BOOSTS
INDIVIDUAL OUTPUT 1320%**

Cross section of hardened spline section showing hardness extending the entire depth of the tooth and forming a hard case at the root. The soft core is required to give toughness to the finished shaft.



A Selas automatic machine, operated by one man, is uniformly hardening 1240 starter shafts per hour. These shafts, exposed to radiant gas heat for less than 52 seconds, then water quenched, do not require straightening.

This method replaced a salt bath operation in which one man hardened 188 shafts per hour, and a second man straightened them.

A similar improvement may be possible in your plant. Send your inquiries... ship your samples. Inquire about the Selas *ihp** methods as they could apply to your product.

***Improved Heat Processing**

SELAS 

**CORPORATION OF AMERICA
PHILADELPHIA 34, PENNSYLVANIA**

Heat Processing Engineers for Industry • Development • Design • Manufacture

Fatigue Cracks

by William M. Coffey

Aptronyms

Today our subject will be aptonyms. And what better way is there to present this lively topic than to quote from an expert, Mr. C. C. Finn of San Francisco, who is an old friend of *Fatigue Cracks*. Pay close attention. We know you'll enjoy his letter:

Dear Mr. Coffey:

The aptronym crop has been very slow in appearing for some time. I look for them in the papers very carefully, so maybe they have quit being news to the fellows who write the papers.

I note that you are trying to get fired. I have sent Mr. Post (who formerly wrote *Fatigue Cracks*, but now has safely escaped—Ed. Note) from time to time certain clippings which he refused to print as being immodest and likely to bring blushes to the cheeks of the *ffj's* select circle of readers. As you may be desperate to get fired you might risk a few blushes. One was the notice of a wedding license taken out by

CENSORED (Ed.)

The other was the notice of a son to Mr. & Mrs. (CENSORED) of West Seattle, and I merely remarked

CENSORED (Ed.)

These and the following are merely odd names which attracted my attention (I enclose the clippings). Elizabeth Coffin is engaged to Lloyd Graves.... Charles Flesh and Chic Blood are clerks in the same airline office... R. J. Christmas and Edgar Noel will have their phones disconnected until after Christmas... A. Drake is filing for nomination to the office now held by Franklin F. Swan....

Snow and Rainwater were witnesses in a trial... Ellen Rush and Leona Quick collided (that is, their cars did) at a street intersection... Edward C. White was arrested for drunk driving by Constable Peter J. White and was defended by Attorney Frank J. White, but Prosecutor George J. Black won the case... Harry First got the first fishing license of the season... John A. Wild joined the law firm of Boris Wooley... Coffee and Pott had an auto collision, but there were no grounds for the police to cite either... and finally, a mammoth tusk over 11,000 years old

was found in an Iron Age settlement.

Now for a few "reverse" aptonyms. Doris Perfect has had a guardian appointed because she is incompetent... Les Trout is the new conservation officer at Caldwell, Idaho... Margaret and Calvin Darling got a mutual divorce... Kay Landing is a stewardess on a plane... Will Scent is a collector of back taxes... Jesse James is president of a motorcar agency... Alan D. Thistle is president of the Hawaii Weed Conference... Mr. Short and Miss Beery take out a wedding license... and John Minor Wisdom (accent on the 2nd name?) joins the Dept. of Justice.

Lots of the Best,
C. C. Finn.

Thank you, Mr. Finn. Your aptonyms, indeed, are the best we've heard in a long time. We'll be everlastingly grateful if your contributions accomplish their worthy purpose.

Some More Help

... but if they don't, here's another contribution that will surely do the trick. It comes from George Elwers, who says, "if this doesn't revolt your readers, I don't know what will"...

A communist named Rudolf said to his wife, "We can't take our nightly walk, dear, because it's raining."

She said, "That's not rain, dear, it's just fog."

He said, "Don't tell me it's fog, when it isn't. After all, RUDOLF, THE RED, KNOWS RAIN, DEAR."

We think it's perfectly wonderful how everybody is going out of his way to help us out. It just rejuvenates our faith in the brotherhood of man. Yes, it does.

Puzzlers

This is called the King's Gardener and is given in poetry. His Majesty's old gardener had died and had to be replaced. To screen out the undesirable applicants each had to solve this problem to be eligible for the position.

The King's Gardener an orchard must grow
9 straight rows, 5 trees in each row

If his Majesty you would please
This you must do with 19 trees.

THREADED SPECIALTIES

EYE BOLTS

by an
exclusive method



Among Pawtucket's many specialty products, these lower-cost eye bolts or "swing" bolts are the leaders in this field. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes 1/4" and larger, or to your specifications. In any size, you can depend on a uniform Class 3 fit.

BETTER BOLTS SINCE 1882

PAWTUCKET

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Dates to Remember

Meetings

DECEMBER

POWER CRANE & SHOVEL ASSN.—Annual meeting, Dec. 16-17, Drake Hotel, Chicago. Association headquarters are at 74 Trinity Place, New York.

JANUARY

ALUMINUM WINDOW MANUFACTURERS ASSN.—Winter meeting, Jan. 8-9, Saxony Hotel, Miami Beach, Fla. Association headquarters are at 74 Trinity Place, New York.

AMERICAN HOME LAUNDRY MANUFACTURERS' ASSN.—Annual meeting, Jan. 8, Morrison Hotel, Chicago. Association headquarters are at 20 N. Wacker Drive, Chicago.

TRUCK - TRAILER MANUFACTURERS ASSN., INC.—Annual convention, Jan. 11-13, Boca Raton Club, Boca Raton, Fla. Association headquarters are at National Press Bldg., Washington.

SOCIETY OF AUTOMOTIVE ENGINEERS—Annual meeting and Engineering Display, Jan. 11-15, Sheraton-Cadillac and Statler Hotels, Detroit. Society headquarters are at 29 W. 39th St., New York.

NATIONAL CONSTRUCTORS ASSN.—Annual meeting, Jan. 12-14, Commodore Hotel, New York. Association headquarters are at 50 E. 41st St., New York.

AMERICAN BOILER MANUFACTURERS ASSN. & AFFILIATED INDUSTRIES—Mid-winter meeting, Jan. 14, Cleveland Hotel, Cleveland. Association headquarters are at 1571 W. 117th St., Cleveland.

INSTITUTE OF SCRAP IRON & STEEL, INC.—Annual convention, Jan. 17-19, Statler Hotel, Washington. Institute headquarters are at 1729 H St., N.W., Washington.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter meeting, Jan. 18-22, Statler Hotel, New York. Institute headquarters are at 33 W. 39th St., New York.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 20-21, Pierre Hotel, Hampshire House, New York. Institute headquarters are at 600 Fifth Ave., New York.

THE ALUMINUM ASSN.—Annual meeting, Jan. 21, New York. Association headquarters are at 420 Lexington Ave., New York.

AMERICAN MANAGEMENT ASSN.—Marketing Conference, Jan. 27-29, Roosevelt Hotel, New York. Association headquarters are at 330 West 42nd Street, New York.

THE IRON AGE Newsfront

NEWSFRONT

NEWSFRONT

NEWSFRONT

NEWSFRONT

A MAJOR PROGRESS REPORT on use of automotive gas turbine engines is expected soon. At least two automakers have been doing research under closest secrecy. While no production plans are expected, the report will spread open the possibilities for automotive use.

MORE EGGS IN MORE BASKETS is Ford's attitude toward its sources of automatic transmissions. Next March, when tank production runs out, the company's Livonia plant will start production as a third source of transmissions.

INDUSTRY ACCEPTANCE OF COBALT 60 is increasing steadily. AEC reports about 700 Cobalt-60 shipments now being made annually, with 80 pct going to industrial users. Price reductions have helped this trend. A 500 millicurie source can be obtained for \$250.

MORE SPECIAL PAINTS WHICH SERVE AS THERMOMETERS are being developed. Navy scientists have produced paints which change color as temperatures rise from 50° to 278° C. They're working now on compounds which will indicate temperatures in jet engines.

STEEL LABOR TROUBLE COULD INTERRUPT production next year. United Steelworkers of America has already been beating the drums for more pensions, improved social insurance, higher wages, and guaranteed annual wage. With firm control of the union and more money in the treasury, Dave McDonald is in a strong bargaining position.

SMALL PLANT OPERATORS are paying more attention to cost saving in rebuilt and used machinery while preparing for a tough selling year. Plants which can't qualify for leasing of government tools are especially interested in shopping for machinery bargains.

IRON ORE FROM CERRO BOLIVAR will probably start reaching the U. S. soon after the first of the year, Labrador ore is not expected in quantity until late next year.

COMMERCIAL SIZE SPECIALTY STEEL INGOTS will be produced in equipment now being built by one steel company which will permit vacuum, inert atmosphere or reducing gas melting. First production: High temperature alloys for jet engines. Later: Tool and specialty steels.

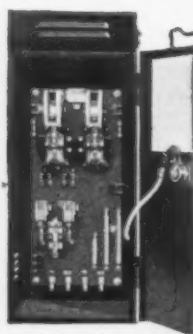
GRAIN SIZE IN METALS can now be determined by ultrasonic, nondestructive testing. The method may prove valuable in establishing grain size in fabricated metal parts without scrapping the piece. Parts in service at high temperatures may be tested without disassembly.

ONE GERMAN MANUFACTURER is planning to take out a license to produce cold extruded steel products from an American company which has done much development work in this field. It's a new twist on an old story. The Germans fathered the process.

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CLEVELAND 4, OHIO

"I Worked in Russian Machine Tool Plant"

♦ Austrian POW engineer tells The Iron Age secrets about the Soviet machine tool industry. Says Russians are using a lot of lend-lease machinery we gave them in World War II.

♦ Searched Russian machine tool plant's files to get figures on tool production. Tells how the Soviet is able to steal designs of our latest types of machinery.

♦ Figures on expansion of the Russian machine tool industry since 1948, plans for the next few years. Reports material shortages have been easing since last fall. Workers now eat better.

I was a prisoner of war in a Russian machine tool plant at Sverdlovsk in the Urals. I don't want to invite Red reprisal so I cannot identify this plant too closely. But it was one of the control centers for the whole Russian machine tool industry. I was held as an Austrian slave laborer for several years, and I managed to assemble enough facts to indicate Russian machine tool progress.

Before the Reds took me I was an engineer in Austria. They made use of me by putting me in one of the plant's administration offices. Here I could search office files to get the facts on Red production. What helped me was Russian red tape and dread of discipline that forces plant directors to keep exceptionally complete files.

Use Lend-Lease Tools

You Americans may be interested to learn Russian industry is still operating a good deal with lend-lease tools you gave them in World War II. Engineers at the plant told me Russia has a lot more of these tools than U. S. records show. Many that were sent to Great Britain, China, Italy and other countries were later transhipped to Russia.

(Ed. Note—U. S. Commerce Dept. told THE IRON AGE its figures show that approximately \$521 million worth of machine tools and metal-working machinery was shipped from the U. S. to Russia from 1942

through 1946. Most of this machinery was exported under lend-lease.)

Central Office machine tool figures I saw last May revealed that 52 pct of Russian tools now in operation are more than 10 years old. About 25 pct are older than 20 years. (Ed. Note—This would indicate overall Russian production facilities may be more modern than our own—although much smaller. Estimate for U. S. is that 66 pct of our tools are more than 10 years old, 20 pct over 20 years.)

Along with tools given through lend-lease, Russia now gets latest model American and European tools. Some of these are sent to research departments where they are stripped and tested so exact duplicates can be made.

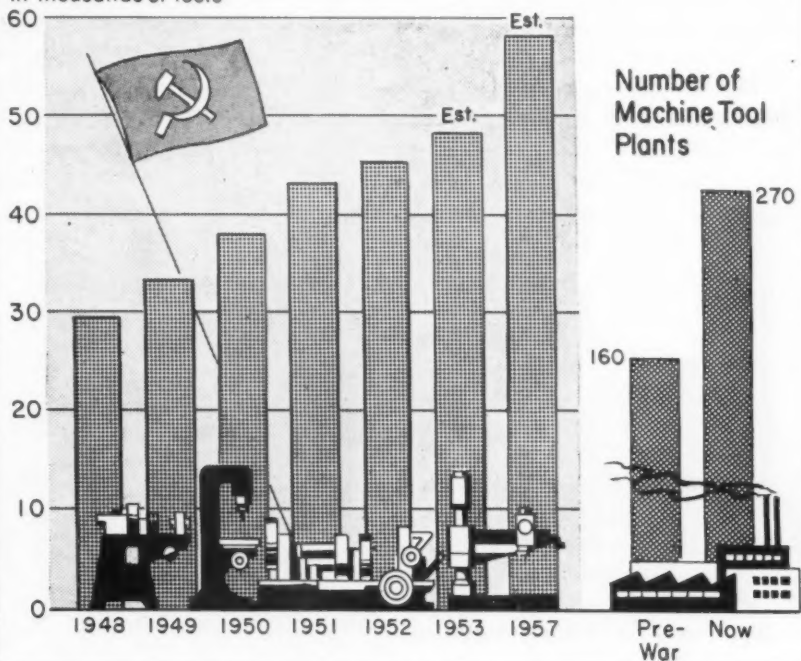
Have "Copying Offices"

The Russians have between 30 and 35 of these research laboratories at machine tool plants all over Russia. Lathes for example go to plant No. 115 at Novo-Sibirsk, shapers to 64 at Gorki, hydraulic presses to 101 at Kurgan. Other "copying offices" are at Chelyabinsk, Gorki and Kalinin.

The Soviets seem to be able to get around trade restrictions to get latest model tools from America, Great Britain, Germany and other countries. I remember seeing the words Cincinnati and Hydroform on a machine received at Chelyabinsk and heard it had been sent

RUSSIAN MACHINE TOOLS PRODUCTION

In thousands of tools



from South America. I also know a 150-ton hydraulic press made by the German Merklinger firm arrived at Kurgan research department last February.

No Materials Shortage

Most Russian tools being turned out are copies of foreign designs, but their own models are improving. At Sverdlovsk there was a Russian double-acting press which formed 280 car bumpers per hour. Also there were new Russian electric welders, squaring shears and boring mills which compare well with Western models.

Figures I saw in office files at Sverdlovsk show Russian machine tool production has been increasing in the last 5 years. In 1948, 29,700 tools were made. Every year since then has registered an increase. This year they expect to make 48,000 tools and from what I was able to learn Russians say they will make 58,000 by the end of 1957. This is a 5-year plan goal.

Supply shortages, particularly in castings, have ended. Since the fall of 1952 I heard of no serious supply restrictions.

Defense Cutback

Where machine tools go from production lines, I couldn't find out. This information is kept secret by GEKU, the economic security control office. But talking to rail and truck workers I learned that 77 tools were shipped in April to a new defense plant near Anadyr in the East.

Generally, defense plants have been getting fewer machine tools since 1951. Most defense orders came in 1949.

You must remember Russia did not demobilize in 1945 and 1946 and operated at full speed from 1948 through 1950. Since then, output has been declining—except in aircraft and jet engines.

Only a small part of machine tool production is sent to other countries. Most recent figures I saw showed that China and other Communist countries got about 1400 tools in both 1951 and 1952. Some of Russia's tool output goes

into a defense reserve. Size of this reserve is a guarded secret, but I learned in 1950 it totaled 17,000 tools. Today, about 5 pct of tools made go into that reserve.

Before the war, Russia had 160-170 machine tool plants, three-fourths in Europe. Now it has around 280 plants all over the Soviet.

They Eat Well

Compared with West Europe, I would say Russian plants have too many workers both in offices and production lines. Most workers are on a 48-hour week and more than half the plants have two shifts operating.

Living has improved for workers in the last 2 years. Food, excepting meat, seemed more plentiful. Workers in machine tool, defense and other industries eat in plant canteens. Laborers get about 3500 calories each day, office people 2700. Workers' families also eat in plant canteens. How much you eat depends on how much work energy you expend.

Russians are now trying to raise production per worker and are having some success. Some tool plants compare very well with those in West Europe. But one thing I hope for—that the Russian industrial organization, built on fear, propaganda, and desperation, may be hamstrung by its basic weaknesses if real crisis arose and there was no America to extend lend-lease industrial supplies.



"You're getting less efficient too. I made six mistakes in that letter and you only found three."

Compensation:

Administration will propose better unemployment benefits.

Higher unemployment compensation rates over a longer period will be proposed by the Administration early in 1954 as a barrier against recession, Labor Secretary James P. Mitchell discloses.

Though he insisted in a recent Washington address that the national economy "remains one of great strength," he also spoke of work on "several" programs which might be used to maintain business stability and growth.

Will Ask Hikes

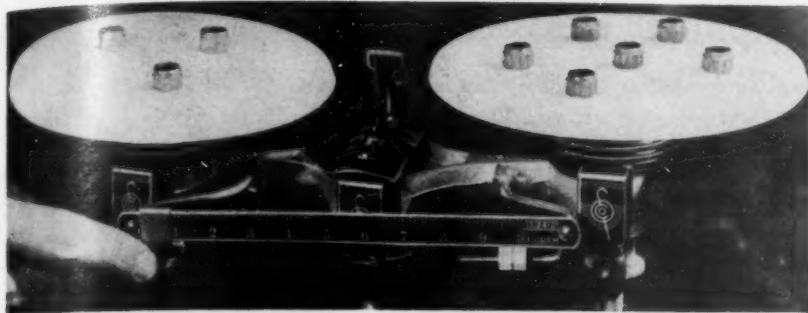
Without delay, he predicted, the Administration will ask for increases in the unemployment benefit rate and the duration of payments. He also said there is official support for raising the 75¢ per hour minimum wage figure and broadening coverage of compensation legislation.

Unemployment insurance reserve funds, which now amount to nearly \$9 billion, could serve as a "great force to prevent a downward spiral," in Mitchell's view. Rates at which compensation is paid vary from state to state, but the average amount is about \$23 per week. Average duration of payments is approximately 22 weeks.

States Set Rates

The states set the amount and duration of payments and compensate the jobless from a payroll tax on employers. Congress and the Administration could recommend that the states raise the amount of benefits and lengthen the payment period.

While indicating that the White House is determined to prevent wholesale unemployment, Mitchell pointed out other possible measures for use in preserving economic health. Consideration is being given, he said, to tax "devices" to encourage business investment in such fields as plant expansion.



LIGHTWEIGHT TITANIUM shows up dramatically in this scale test. Three double-hex titanium nuts weigh less than six conventional steel nuts.

effective all-metal locknuts are of the beam type, which depend on a certain minimum springiness in the metal to achieve gripping action. Titanium metallurgy is not yet sufficiently advanced to produce this springiness.

In addition to strength-weight ratio and high temperature performance, other properties of titanium making it especially suited to aircraft use include excellent corrosion resistance and extremely low magnetic permeability. This permits use of Ti where magnetic materials would adversely affect operation of the electronic equipment which jams modern planes.

LOCKNUTS: Titanium Cuts Plane Weight

Weight savings of up to 1 ton in fighters seen by use of titanium fasteners . . . ESNA introduces Ti locknuts for aircraft . . . Less than half steel nut weight—By G. G. Carr.

Weight savings of as much as 1 ton may soon be possible on American fighter planes through use of titanium fasteners. Locknuts of the metal, now commercially available from Elastic Stop Nut Corp. of America constitute a major advance in improving aircraft speed, range and performance through reduction of fastener weight.

Part of ESNA's initial production has been earmarked for Republic Aviation Corp., which is conducting extensive investigation of titanium aircraft components. Republic has estimated that substitution of titanium for steel in all aircraft fasteners could save as much as 213 lb on a fighter plane.

Weigh Half As Much

Assuming redesign, this would amount to a saving of more than a ton of overall airframe weight. Engineers figure every pound saved in design structural weight makes possible a weight reduction of about 10 lb. Basis for this ratio is the fact that any additional weight in a plane needs increased structural strength to support it.

Made of high-strength titanium alloy, the locknuts meet Army-Navy tensile strength specifications for steel nuts of the same thread size, but weigh less than half as much as steel hex nuts. First output will be 12-point (double hex) nuts with nylon locking collars, in sizes from 5/16 to

5/8 in. Other types will be added later. A special permanent dip-type coating developed especially for ESNA's titanium locknuts holds seizing and galling to a minimum.

Need All-Metal Nut

Titanium is notoriously difficult to machine, and production rates so far are considerably under those for steel products. But ESNA to date is using regular production machinery with satisfactory results.

The new nuts will use the well-known ESNA red nylon collar locking principle. One drawback, however, is that nylon cannot be used much above 200 F. Since a prime characteristic of titanium is its resistance to temperatures as high as 800 F, an all-metal nut is an obvious next development. Most



"His bark's worse than his bite."

Ship First Jet Parts to Italy

North American Aviation has sent off the first batch of F-86K parts to be assembled in Italy under the NATO offshore procurement program. Fiat will assemble 50 of the jets under license. Sale and use of the planes is limited to NATO member nations. Difference between the F-86K and the familiar F-86D lies in the armament and fire control system. The K model will carry four 20 mm cannon in place of 24 Mighty Mouse 2.75-in. rockets. The new Sabre will still be able to track down enemy aircraft at night.

New System Speeds Air Drops

Air Force and Douglas Aircraft Co. have come up with a new materials handling system by which a 40,000-lb cargo can be dropped from the C-124 in a matter of seconds rather than minutes.

Briefly, the system employs a pair of rails, a chain drive, and specially designed pallets with capacity up to 18,000 lb each.

Three previously loaded pallets are winched onto the tracks and into the plane through the nose doors. A hook on the pallet engages the chain drive. Aloft and ready for the drop, the aft door is opened and the chain drive started.

What Are Farm Equipment Prospects?

- ◆ Current decline in agricultural equipment sales will worsen in '54 but depression is still only short-term, predicts John L. McCaffrey, president of International Harvester.
- ◆ In an exclusive Iron Age interview, Mr. McCaffrey stressed that new products, hard selling, growing need for labor-saving devices on the farm will fortify future demand.
- ◆ Present depressed state of the market is due to lowered farm income, droughts, rather than any market saturation.

What are farm equipment sales prospects for 1954 compared with past years?

As it looks to me now, sales of the industry during 1954 will be down somewhat from those of 1953. To what extent, will be determined primarily by the sales efforts of the companies within our industry.

Do you believe that mainly a replacement market will exist through 1957?

No. With a continued tendency toward larger farms and with a shortage of farm labor continuing, the American farmer is going to need additional mechanized equipment to carry on his operations. Further, the industry certainly will develop new types of farm equipment which will make it possible to do more things mechanically. I am confident that such developments will occur long before 1957.

A number of farm equipment manufacturers have expanded into other fields in recent years. Can this trend be expected to continue?

Yes, provided a real market exists for such new products and that the necessary capital to carry on such expansion is available.

Won't the extensive mechanization of American farms since World War II mean a lower farm

equipment business level for the next four or five years?

No. I have predicted that sales for the industry will be off somewhat in 1954. But I make this prediction because of the economic situation facing the farmer in 1954 and not because of any market saturation condition. As I said before, the farmer will need equipment to offset the

Why He's Optimistic

Mr. McCaffrey bases his belief in a strong future farm equipment market primarily on these points:

- (1) Farms are getting larger and farm labor tighter, bringing greater need for mechanization.
- (2) Confidence in the industry's ability to develop new, improved products.
- (3) Growing export markets.
- (4) Continued long-term prosperity for the American farmer.

shortage of farm labor. A replacement market of sizable proportions always exists. And the farmer is always a good prospect for mechanized equipment which will displace work done by hand. I have great faith in the ability of our industry's engineering and research people, and I am confident that from their collective minds will come products which will ever improve the status of the American farmer.

Farm equipment has grown increasingly light and more versa-



John L. McCaffrey

tile. Will this affect raw material purchases by farm equipment builders?

Metallurgical developments have and will continue to improve the quality of our industry's products. Our industry will always be receptive toward any new basic material or materials. But farming is rugged work and demands rugged equipment. Such usage poses some limitations in the use of lighter metals, of course, but engineering and research work will continue toward this end.

New farming techniques and new crops have affected American farming practice greatly in the past ten years. Will this continue?

Most certainly. The application of technological advances on the American farm has brought with it a standard of living for our people unmatched in all the world. The American farmer, always seeking new and better ways of doing things, will continue such progress.

Does the export market offer an outlet for any increasing percentage of farm equipment output?

Yes. The need for modern farm equipment in foreign countries

is tremendous. The growth of such a market will only be controlled by the availability of the funds with which to buy this equipment.

Will the use of lighter equipment affect the use of lighter metals by the farm equipment industry?

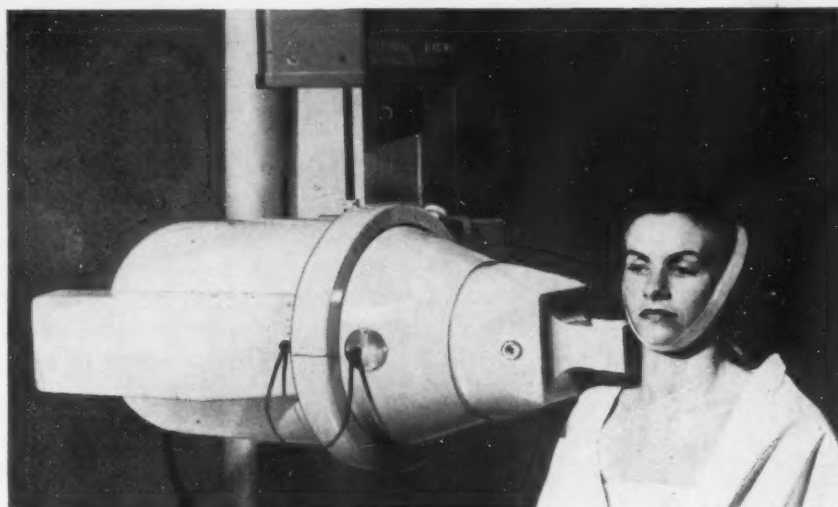
Yes, providing equivalent strength can be attained. However, necessary changes in the processing of the lighter metals may have an effect upon their availability.

Will boron steel continue in use despite the greater availability of alloy steels, and do you expect to see this use expand?

Yes. Any time we can make a product cheaper without reducing its quality, we will do so. Because of its lower cost, the use of boron steel will expand as we learn more about the metal and its use.

The Department of Commerce has indicated that farm capital expenditures seem to have hit a plateau. Do you agree?

No. At the present time, the American farmer is confused. He knows there are large surpluses of some farm crops; but he doesn't know what is being done to dispose of them. He knows that acreage allotments are being planned for 1954, but he doesn't know how these may affect him. He is wondering about Mr. Benson's proposal which he will make to Congress in January. And he is concerned about farm commodity prices. But I have every confidence that the present administration will solve the farm problem. Once the farmer learns more about the new farm program and how it will affect him, I believe much of his anxiety will be removed. After that, farm capital expenditures by the farmer will, I believe, continue pretty much as in the past.



Isotopes Create New Metal Market

Increased use of radioactive materials in industry, medicine and agriculture is creating growing demand for shielding materials. Sales aren't significant in terms of dollars as yet, probably won't be for several years, but heavy metal manufacturers know the market potential is considerable.

Recent reductions in the cost of cobalt-60 (500 millicurie can now be obtained for as little as \$250) should stimulate use of radioactive materials even more. Another added source of demand: Atomic Energy Commission is standardizing a capsule for carrying and handling radioactive material.

Adds New Uses

Manufacturers of heavy metals are eyeing these trends hopefully as the marketability of products whose main assets are density and dimensional stability has previously been rather limited.

Carboloy Dept. of General Electric for example is shining up its Hevimet, a powdered metal combination of tungsten nickel and copper, in hopes of attracting new customers. Previously, main uses of Hevimet were in counterbalances and rotating inertia applications.

Hevimet is only one of a number of similar products on the market. The idea of combining powdered tungsten with other

metals to make it machinable is not new and some patents have actually expired.

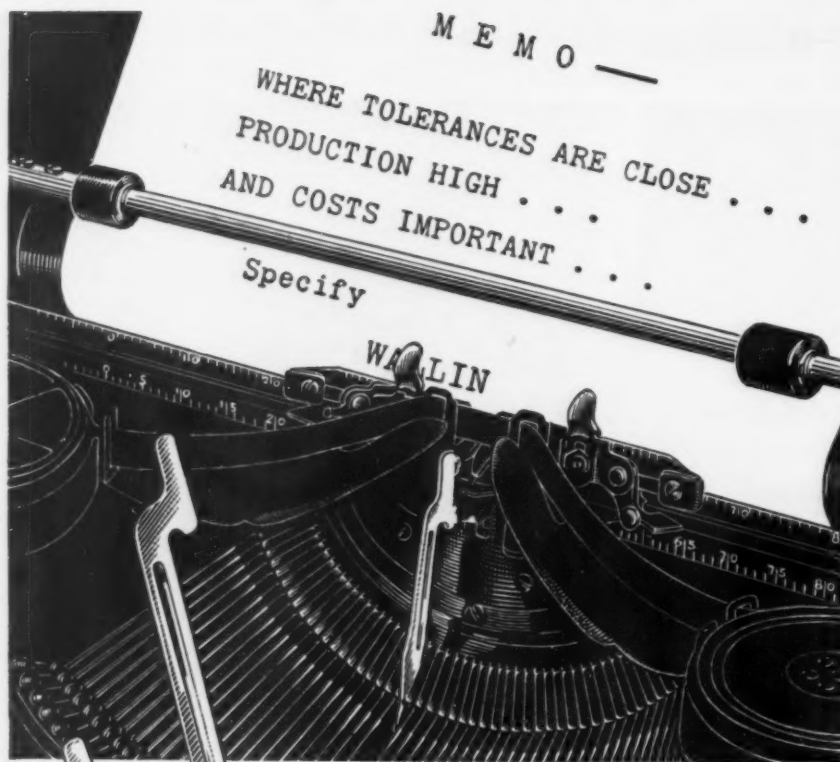
Pocket-Size Effective

Fifty pct heavier than lead, Hevimet has 40 pct more resistance to both gamma rays and X rays than lead. This makes it possible to use less bulk in a shielding operation and still have a stronger, more stable shield construction.

Because of its properties, Hevimet must be purchased in specific sizes and shapes since there is no



GYROSCOPE rotor makes use of strength, density. Rotor, un-machined blank shown.



WALLINGFORD CLOSE-TOLERANCE STEEL STRIP

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A growing list of satisfied customers look to Wallingford Steel for those important extra values in product quality and service. You too will find that Wallingford can meet your most exacting specifications for size, finish, analysis and temper . . . and can deliver what you want when you want it.

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Research

standard line of sizes. A purchaser must furnish drawings of items which can be purchased as pressed and sintered blanks or finish-machined to specifications. Machining properties are similar to gray cast iron, but have a tendency to break out at edges and end cuts.

Its high density is important in radioactive shielding where absorption is generally proportional to the density of the absorbing material. This is especially important where the cone, bomb, or capsule containing the isotope must be of small size.

Melting:

Controlled atmospheres will be used for ingot output.

Controlled atmosphere melting will be used to produce commercial-size tool and specialty steel ingots in a new facility planned at Universal - Cyclops Steel Corp., Bridgeville, Pa. Method has been used for several years experimentally in laboratories here and abroad, but the Universal-Cyclops installation will be the first to apply it to actual commercial production.

Produce for Jets

Initial output is slated for high temperature alloys such as those used in jet engines, but will be expanded eventually to general tool and specialty steel melting. Development of the process makes possible more successful melting of alloy steels containing large quantities of highly reactive elements like titanium, zirconium, aluminum, magnesium.

Controlled atmosphere melting basically permits replacement of normal furnace air by a vacuum or an inert or reducing gas. A specific, controlled pressure can be substituted for atmospheric pressure according to the reactions desired.

Universal - Cyclops has begun construction of the equipment needed for the new installation. Production is expected to get underway in mid-1954.

CASTINGS: Sales Off, Outlook Fair

Fourth quarter is a bad season but '53 totals should match last year's output tallies . . . Foundry outlook for '54 is fair, depends on customers' business—By R. M. Lorz.

A traditional fourth quarter complaint is being heard in the foundry industry again. The 3-day week has become more prevalent because of inventory shake-downs and tapering demand.

Castings production is divided among so many producers it is hard to measure the cutback in dollars. Tonnage comparisons offer no clue either. When final figures are compiled '53 production volume will probably equal last year's output.

Gray iron founders, who produce over two-thirds of all castings, expect to hit the 13-million-ton mark. Steel founders are aiming at a minimum of at least 1.5 million tons. Malleable founders hope to come within a few thousand tons of last year's 926,000 tons.

Malleable Hit Hardest

Lopsided buying patterns have raised most of the question marks. By fourth quarter last year foundrymen were predicting dire things for 1953. When orders started rolling in during first and second quarters they were pleasantly surprised. The slump didn't really get underway until third quarter. At that time vacations sharply reduced automotive consumption and spotty farm demand started to hurt.

Malleable founders have been hit the hardest. This industry normally ships about two-thirds of its entire production to automotive users. Sizable shipments also go to the agricultural market, which has been depressed throughout 1953.

Combined with national trend toward inventory adjustment these factors have thrown a shadow over fourth quarter malleable sales. Some sources estimate that automotive is off 20 pct

while farm business is down 25 pct. Good demand for pearlitic malleable and fittings is credited with reducing overall industry drop to between 15 and 20 pct.

Steel Castings Off 10-15 Pct

Volume production and diversity have helped gray iron founders somewhat. Although industry is operating at only 71 pct of capacity fourth quarter sales are not off as much as was expected. The drop ranges between 8 and 15 pct depending on location of producer. Midwestern foundries serving the farm belt are having the most trouble. In other sections inventory paring and reduced machine tool demand have been causing headaches.

Steel founders find business off about 10 to 15 pct also because of the defense stretchout and cutbacks in freight car building.

The pinch is reviving an old philosophy: Quality and production are still common goals but cost is now assuming the major role it played before World War II. Changed thinking has resulted

in some raw materials juggling. Price of good cast scrap has generally been coming down and many producers are increasing their scrap charge.

Merchant pig iron sales have been affected. It is common knowledge that steelmakers are getting better hot metal yield from greater furnace capacity. Some merchant pig furnaces have been switched over to hot metal.

Other pig iron producers admit they are cutting wind on blast furnaces and stockpiling some pig iron. But so far there has been no wholesale switch to hot metal and it isn't expected. Openhearth scrap is being quoted at below \$35 per ton in most steelmaking centers at the present time. As long as scrap remains competitive pricewise no one expects a major swing to hot metal.

Can't Cut Price

Talk of a possible reduction in price of merchant pig iron also seems premature. In most sections of the country there is still a price differential of \$10 or less between No. 1 heavy melting scrap and merchant pig iron. The \$10 differential is historically acceptable. Prices of pig iron can't come down much because producers must continue to pay for raw materials and labor and freight.

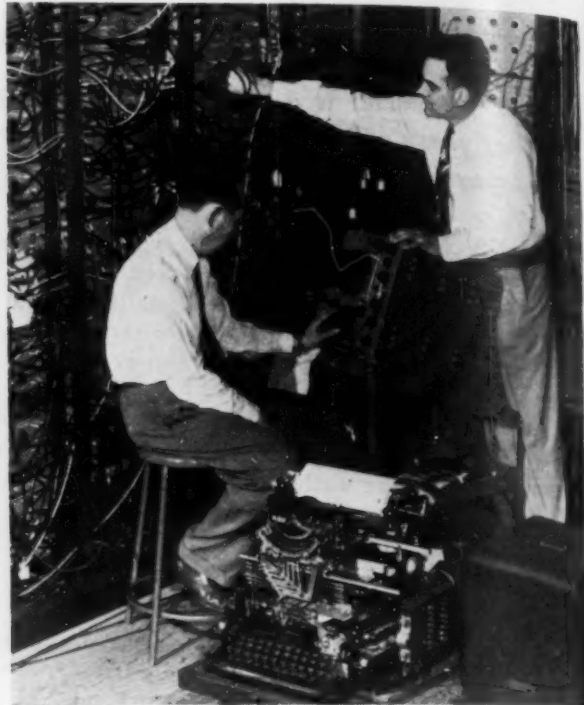
In the final analysis most pig iron producers and consumers say merchant pig iron sales will generally rise and fall with steel production and foundry demand.

Most foundries also have a real aversion to changing proved melt formulas. Foundries producing heavy castings and abrasive shot will continue to increase scrap charges if the price is right. But with few exceptions castings makers will still want pig iron.

Foundry outlook for 1954 is fairly good. Detroit promises to be going full blast and building and construction trades are bullish. If machine tool builders can sell their program of modernization and farm people lose the parity jitters optimism is in order.



MONEY TREE made in Japan 350 years ago was exhibited at annual coin auction of Coin Collectors Society of America in New York. Coins were broken off tree as needed.



COMPUTER: Solves Detroit's Problems

Cooperative effort and expenditure by business, Wayne University give Detroit an electronic computer . . . Will solve industry, business problems for fee—By R. D. Raddant.

An automotive engineering section has an intricate problem involving stress and weight factors of a crankshaft . . . Another Detroit industry wants to set up a program of production scheduling . . . A third has a complex problem in designing a special cam.

Together or singly, these problems might take weeks or even months of work performed by mathematicians working with desk calculators.

But because of a cooperative program undertaken by Detroit industries and Wayne University, these problems can be solved in comparative split seconds by the university's giant electronic computer.

Burroughs Built It

UDEC, for Unitized Digital Electronic Computer, is the name of the electronic brain whose 13 units and more than 3000 vacuum tubes stretch in a semi-circle around a central operating station. It was unveiled last week at

Wayne's computation laboratory and represents 4 years of effort by the university and \$500,000 investment by Detroit business and industry.

The computer itself was built by



MAGNETIC drum memory unit stores up to 5000 items, feeds them back when needed.

Burroughs Corp. in its Philadelphia laboratories. It will be used for the rapid solution of complex industrial and business problems and for training personnel in the electronic computer field.

UDEC is the only unit of its kind in the Midwest and its delivery gives Detroit the only non-government supported large-scale computation center in the country.

Industry Paid for It

The laboratory program was launched by the university in 1949 on the basis of a \$500,000 budget to cover the purchase of the digital computer and maintenance of the laboratory for a 5-year period.

General Motors gave \$150,000 for the construction of the computer. Burroughs, in design and construction of the machine, contributed the equivalent of \$100,000 in services. Ford Motor Co. granted \$50,000 as operating expenses.

Other contributing firms included: American Blower Corp., Bendix Aviation Corp., Calumet & Hecla, Inc., Continental Motors Corp., Detroit Edison Co., Ethyl Corp., Federal Department Stores, Fred Sanders, J. L. Hudson Co., Modern Engineering Service Co., Nash-Kelvinator Corp., Power

Equipment Co., Rotary Electric Steel Co. and Vinco Corp.

With UDEC in operation, Detroit companies may obtain services of the laboratory simply by submitting their mathematical problems. They will be solved on a fee basis.

How UDEC Works

In UDEC's operations, numbers it handles are translated to short electric pulses. It is fed by means of information converted into holes punched in a paper teletype tape. This tape is passed through a tape reader which converts the pattern of holes into a corresponding pattern of electrical pulses.

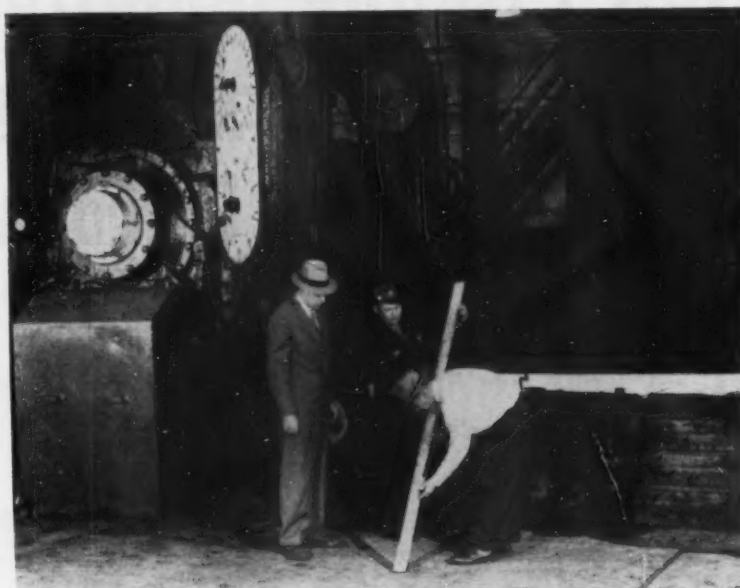
This information is sent to a memory drum, which is a cylinder of aluminum coated with a layer of black iron oxide which can be magnetized in spots by a writing head. A mathematical unit does the figuring. When the problem has been solved, results appear as a pattern of electrical pulses which is fed to a teletype printer. The answer appears as decimal numbers on paper and can be read directly.

Any Questions?

What kind of problems can be solved by UDEC? It already solved a complex problem of valve mechanism. It can develop a linear program of production scheduling. It could shorten the time of designing a V-8 engine.

It can solve problems of bearing loads, vibration of shafts, torsional vibration, automotive ride qualities, heat conduction or ignition. In business management it can be adapted to production scheduling and inventory control, the field of banking, scheduling, payroll and labor distribution, market forecasting and even political trends.

University officials admit they have a problem of educating Detroit industry to the possibilities of UDEC. In other words, like anything new, UDEC has a problem of gaining acceptance. But at the same time they are confident it will and that UDEC will become as familiar to Detroit business as is Wayne's old brick administration building where UDEC does its work asking only for warmup time.



BURNED LENGTH of pine board checks accuracy of electronic strip-width gage.

How to Check an Electronic Gage

The electronic age is here—but a simple way of checking the engineer is always a good idea. U. S. Steel Corp. has installed an electronic gage to measure width of steel as it zips through the 80-in. hot strip mill at the Gary Sheet & Tin Mill.

But the rolling crew verifies the accuracy of the gage by a device that is almost equally ingenious—because of its simplicity.

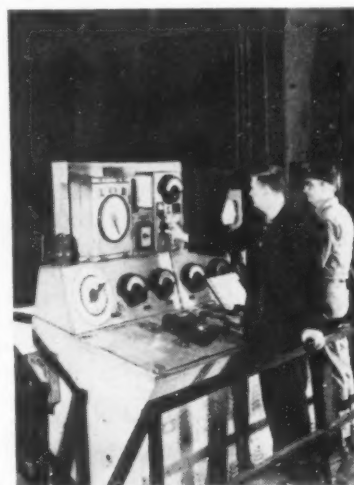
Devised by department superintendent Rolland E. Peterson and his assistant, Charles Sanford, the checking "instrument" consists of a 4-in. pine board 8 ft in length, placed under the racing strip.

Both gages are operated by the fiery heat of the steel. The electronic one by means of infrared rays, an intricate arrangement of prisms, rotating mirrors and electronic equipment; the wooden one by being burned to the exact width of the strip as it passes over the board at more than 1500 fpm.

The measured length of charred wood had better agree with the electronic gage's findings or accuracy of the latter is suspected.

But before you cancel your order for electronic equipment and dash down to the lumber yard, remember that the board's reading is of the widest part of the strip while the electronic device provides a continuous measurement.

Still, this combination of electronic science and plain shop savvy enables the mill to produce and control the width of coiled steel more accurately.



ELECTRONIC gage measures and records strip width as it leaves last mill stand.

New Pickling Inhibitor Preserves Surface During and *AFTER* Scale Removal

Houghton "Acitrol 3129" effective across-the-board . . . assures minimum breakdown over long periods at high temperatures!

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Houghton Acitrol 3129 maintains its effectiveness over the full temperature range—resists breakdown even in pickling installations run at long periods over 200° F. This means you can benefit through the increased production rates Acitrol makes possible. And low temperature baths may be maintained effectively even if less inhibitor is used.

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International

EUROPE: Is Closing

Value of U. S. exports to west Europe still tops imports . . . Military spending tips scales.

Western Europe is gaining in its drive to close the dollar gap.

There's still a breach between dollars required and dollars available to most European buyers of U. S. goods. This problem has been a chief worry to the debtor nations since World War II. Gradually, though, Europe is accumulating the credits to pay for its imports.

List the Factors

U. S. Commerce Dept. figures show the margin separating the cost of American shipments to Britain and the Continent and the value of imports from that area was \$895 million in favor of the U. S. at the end of the April-June quarter. When U. S. payments to Europe for military supplies and services were subtracted, the foreign nations actually had \$231 million to their credit.

A year earlier the situation was less favorable to the Europeans. The U. S. margin of export over import values was \$648 million. When the amount for military expenditures was taken out, the U. S. still showed a favorable balance of \$152 million.

Things Look Better

Factors which contribute to improvement of the European dollar position are:

(1) Levels of industrial production abroad are generally higher than in pre-war years, which means Europe is better able to satisfy its own needs for many finished items.

(2) U. S. spending for maintenance of armed forces overseas has climbed and the military "off-shore procurement" program has grown.

(3) American imports, especially of raw materials, have been on the rise.

(4) Some trade barriers affecting imports of U. S. goods are

Closing Down Dollar Gap

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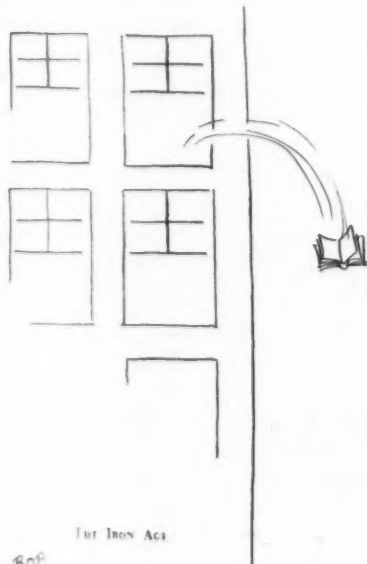
more stringent than they were earlier. This method of hanging on to the valuable dollar is not beneficial to the U. S., but it's pointed out that Britain, for example, has used it.

Effects of these and related conditions has been to put the European economy on a more nearly equal relationship with that of the creditor nations. The upsurge in business health has not been uniform, of course, and not every country has shown the most favorable trend possible.

Europe Competes in U. S.

Switzerland, which enjoys full dollar convertibility, has not been bothered by the complaints of some of its neighbors. Western Germany has made a notable recovery in productive output, but it must improve its monetary position to achieve real stability. France, too, is enmeshed in monetary problems.

All told, however, Europe has an improved dollar status. Its eagerness to sell its products to the U. S. is already creating headaches among American industry, and recommendations for tariff changes next year may reflect this concern.



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December 17, 1953

STEEL: Barge Shipments Sail Up

Movement of steel on inland waterways grows . . . Further increase in '54 seen . . . Save money, lose time . . . Ship variety of items . . . Lakes shipments grow—By K. W. Bennett.

Climbing shipments of steel moving in barges are expected to accelerate in 1954. Consumers have seen a steady growth in the use of barges to haul 500-ton-and-up steel shipments since the beginning of the year. From a number of sources come reports indicating that, whatever steel production for 1954, more steel than ever before will be shipped over the nation's inland water routes.

Products Not Limited

One steel traffic man foresees increases of as much as 50 pct over 1953 levels in the tonnage that his midwestern mill will move by water during the coming year. Conservative estimates place the tonnage increase at "10 pct or better." Top figure quoted includes movement of steel on the Great Lakes as well as on inland barge routes.

Customers who began to move into a strong inventory position shortly after the middle of the year are sacrificing speed on long hauls to achieve some freight savings.

Barge lines in the East have been reporting a steady increase in steel shipments since the opening months of 1953, but barge owners in the Midwest noted the greatest acceleration in shipments at the close of the second quarter of 1953. Movement has not been confined to bulk items where fabrication costs represent a considerable share of the finished goods price.

Besides plate and structural, tinplate, galvanized sheet, cold-rolled sheet, bars, billets and rod have been moving down the waterways. There is a strong belief that Great Lakes traffic in 1954 will see an advance in the amount of sheet moving along that route as well.

To date, most shipments of steel

have run upwards of 500 tons, and one mill set its lower limit on steel shipments by barge at a 750 ton minimum. But in some cases steel will accumulate at the barge shipper's dock for as long as a week, giving the producer considerable time to accumulate a tonnage that will give him the minimum freight rate.

One shipper out of Chicago estimates that he can get steel to New Orleans in 3 to 5 days by rail, or 8 to 10 days by barge. He can make a shipment to St. Louis in 2 to 3 days by rail, 4 to 5 days by barge. With these time losses in mind, one shipper figures his cost reduction will amount to \$3.50 per ton in moving steel to St. Louis, \$5.85 per ton on billets to Memphis, \$2.05 per ton on bars to Canton, Ohio; and \$1.46 per ton in moving bars to Louisville, Ky.

A shipper who is moving steel from Chicago to points as distant as Houston figures that he can save \$14 a ton, provided of course he has sufficient tonnage to meet minimum requirements. Another has moved steel to Minneapolis at an estimated \$7-per-ton saving.



"Cheer up. They may find those plastic auto bodies melting in the sun."

Steel Shipments Set Records

December shipments of steel products from mills on the Ohio, Monongahela and Allegheny Rivers in the Pittsburgh area to river ports on the Ohio, Mississippi, Cumberland, Tennessee and Missouri Rivers and on the Gulf Intracoastal Waterway and Houston Ship Channel will break all tonnage records for a single month, the American Waterways Operators, Inc., predicts on the basis of schedules.

Despite these advantages, the barge picture is not unblemished. Dock and handling facilities must be available, small lots aren't easy to ship. As a result, many shipments go partially by barge, finish the trip by rail or truck. Rail and truck shipments will not suffer greatly, though it is believed that rails will lose relatively more tonnage than will truckers, who have always been limited on the amount of steel they can handle.

Woo Small User

Almost since Korea began, barge operators in the Midwest have shipped foreign steel up the Mississippi during the winter months when the Great Lakes ports were closed. This year that traffic isn't expected to develop, and in the future the steel moving along the waterways will be domestic. Some foreign steel was still being shipped as late as this fall, but this movement is regarded as dead.

The long-haul, heavy tonnage customer who can take his steel in quantity is a good bet for some water shipment of steel during 1954 and a far better bet than he was in July or August of this year. He'll combine water and rail shipment, but will take more by water than he did in 1953.

That leaves the smaller consumer. He would have to take advantage of a freight forwarder or some kind of combination of his raw material needs with other small users in his area. At least one freight forwarding association is in operation, with another group reported in the offing.

STEEL: Selling Burden Grows

Freight absorption buries producers under mass of red tape . . . Customers are hard to woo . . . Supplier-customer relations have changed drastically—By J. B. Delaney.

Freight absorption has buried steel producers under a mass of detail rivaling the days of government controls. Other problems arising out of a more competitive market are compounding the burden.

For those producers who had set up their freight absorption machinery in advance, daylight is in the offing; by end of the month they hope to be operating on a current basis. But mills that took the step belatedly will be struggling to clear the decks in first quarter.

Will Get Credits

Mill departments up to their ears in freight absorption problems are sales, traffic, and accounting. Company lawyers also are getting a workout wrestling with legal aspects.

For the steel consumer, absorption will mean money in his pocket eventually. But even the producers who started early are just getting around to issuing credits covering freight charges they have absorbed. Meantime customers are being notified that absorption will be retroactive on shipments already made.

Some producers are going to a lot of trouble to make sure that competition actually exists before they absorb freight to meet it. When a customer says he has been offered a product by a competitive mill at such-and-such a price, the information is checked to the point of determining whether the competitive mill really produces the product, size, and shape involved.

Unlooked-for situations have begun to crop up. For instance: A producer absorbs freight to meet competition at a distant point. A nearby consumer of the same product hears about it and asks for the same concession on grounds that the absorption is

tantamount to a reduction in the base price. What to do?

Fortunately for producers, their customers show no inclination to shift their business willy-nilly to the first competitive mill that offers them a better net price. Even small consumers are taking a long-range view on steel supply. They are gun-shy of the opportunists they know will leave them high and dry in a tight market. Consequently they are giving normal suppliers ample opportunity to meet competition.

This consumer attitude prevails even in cases where major producers attempt to sweeten order books with business they passed up when demand exceeded supply.

As expected, the changed competitive picture has altered the attitudes of customer and producer toward each other. Consumers have become more particular on quality and delivery. Rejection rate for quality reasons is moving upward.

Producers are finding it necessary to drop extras that consumers formerly accepted even though the extra processing was not needed. The mills also are offering

low-profit items as an inducement to consumers of more profitable products. Some mills had discontinued or drastically reduced production of low-profit items when the market was tight. Consumers report they are now able to buy a higher percentage of light plates, hot-rolled strip in lighter gages, and plain hot-rolled sheets where formerly they had to settle for pickled and oiled sheets.

Some consumers are asking—and getting—delivery on a weekly instead of the normal monthly basis. In short, the customer is now in position to specify the week of the month in which shipment is to be made to him. Used to be that users were happy if delivery could be made within the month specified.

Ask Shorter Delivery

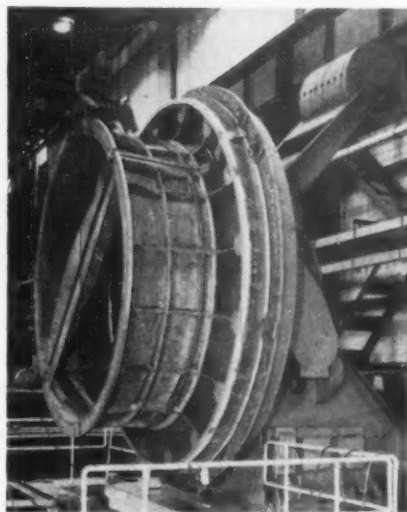
In their drive to reduce inventories and hold them to a minimum, some steel users apparently are going overboard. The mills are being pressed for delivery promises well within the normal production cycles. One consumer recently placed an order for sheets and asked for delivery in 30 days. This can be done but it upsets production schedules.

At a recent meeting of steel consumer purchasing agents, the consensus was that there is no incentive to change suppliers to gain an immediate price advantage. As a result it's not likely that there will be wholesale shifting from one producer to another.

Deny Newport Steel Sale Reports

Reports of negotiation started for merger or exchange of Merritt-Chapman & Scott Corp. stock for shares of Newport Steel Corp. were called "without basis" last week by William J. Mericka, chairman of the finance committee of Newport Steel.

Mr. Mericka's statement followed an announcement the week before by Merritt-Chapman & Scott of the authorization of negotiations to acquire Newport. Mr. Mericka indicated that this announcement had been communicated to him, but that no formal offer has been received.



Giant welding positioner rotates 40-ton weldments. Made by Worthington.



TRACTOR: Backyard Farms in Suburbs?

Sears Roebuck will sell midget tractor . . . Hopes to interest Sundown Farmer (white collar man with land) . . . Tractor will sell at \$598, powered by 6.5-hp motor—By K. W. Bennett.

For about the price of a good pot roast, you can own your own tractor. Sears Roebuck hopes to mail order and retail a 6.5 hp midget—the Tri-Trac—to white collar workers who will farm after office hours.

Sears wants to plug what it feels is a demand gap between the little walk-along garden tractors, and the light tractors marketing at \$1,000 and up. When the banker, executive, or openhearth attendant arrives home, he can roll up his sleeves, mount his Tri-Trac and begin plowing a pretty fair size truck garden.

The Sears tractor, f.o.b. factory, will cost \$598, grosses about 895 lb without attachments. It measures 80 by 56 in., allows the weary office worker to ride as he tills his fields, grades his lawn, shovels his drive, or mows his lawn in the gloaming hours.

Markets Hoped For

Powered by a one cylinder, air cooled 6.5 hp Wisconsin Motor, the tricycle tractor features 12 specially designed tools, top

speeds of 4 mph down to 2¼ mph, and a cam-pulley arrangement that eliminates clutching.

The hoped for market: Institutions, large estates, small farmers, lightweight jobs on big farms. But, above all, Sears is out to capture the "Sundown Farmer" market. Sears' powerful midget is designed to work properties from 1.5 acres up to 30 acres. With about 2 million farms in the less than 50-acre class, their chances look good.

After 5 years of development, Sears turned over a production model with attachments (these are not included in the \$598 f.o.b. price) to one of its engineers who was reckoned to be an average potential customer. He had a 40-hr-a-week job, two boys aged 9 and 11, and some land.

The engineer proceeded to demonstrate the economic feasibility of owning a Tri-Trac. Within a few months the value of crops he produced roughly equalled the price tag of the tractor. (The engineer had an advantage, though—some knowledge of farming.)

The Sundowner can hitch his tractor to other chores, use it as a snow plow, a bulldozer, a hauling trailer, or a lawnmower. Whatever he is doing, if he has over 1.5 acres of the good earth to till, he is a potential customer. With suburban living on the upswing and lawns increasing in acreage, Sears feels they will be moving into an important new market. As one Sears executive quipped, "It could start a back-to-the-farm movement."

Defense

"How to Sell Defense Items"

All principal buying and contracting offices of the armed forces, including joint-service agencies, are listed in a new government pamphlet, "How to Sell to the Dept. of Defense."

Purpose of this publication, which supplants three pamphlets formerly issued independently by the military departments, is to give manufacturers and other potential suppliers of defense materials and services the basic information on military buying methods and items wanted.

Accompanying this new pamphlet is a second one called "Purchased Items and Purchasing Locations of the Dept. of Defense." It provides a cross-reference between general classes of commodities and the procurement offices responsible for buying them. This pamphlet also tells how to get bid invitations and requests for bid proposals.

Businessmen may obtain both pamphlets at any buying office of the Army, Navy, Marine Corps, and Air Force by sending a post card request or making a personal call.

Name Webster to Defense Dept.

Heading the directorate of procurement and production policies in the Defense Dept., beginning about Jan. 1, will be Warren Webster, Jr., Camden, N. J., businessman.

Mr. Webster served Army Ordnance Corps in World War II.

He will work under Charles S. Thomas, Assistant Defense Secretary for supply and logistics.

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FOREIGN AGENTS IN PRINCIPAL COUNTRIES OF THE WORLD

Industrial Briefs

Leases Space . . . THE AMERICAN BRASS CO., wholly owned subsidiary of Anaconda Copper Mining Co., has leased a major portion of the 17th floor in the new Tishman Bldg. at 99 Park Ave., New York.

To Build . . . WESTINGHOUSE ELECTRIC CORP. will build a new metals development plant at Blairsville, Pa. Plant will be devoted to metallurgical development and pilot production of special alloys, castings.

Trust Fund . . . LEHIGH STRUCTURAL STEEL CO., Allentown, Pa., will contribute an estimated \$120,000 in 1953 to its profit sharing trust fund for hourly paid employees.

Appointed . . . THE LAKE SUPERIOR IRON ORE ASSN. has appointed as vice-president Hugo E. Johnson, assistant manager, Project Development Group, Battelle Memorial Institute, Columbus.

Motor Plant . . . GENERAL ELECTRIC CO. plans to build a multi-million dollar plant and headquarters at Holland, Mich., for its Hermetic Motor Dept.

Safety Record . . . WORCESTER PRESSED STEEL CO., Worcester, Mass., was presented with a plaque commending the company for its outstanding safety record by Lumbermens Mutual Casualty Co. at the Worcester Industrial Exposition last month.

Director Named . . . AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS has elected Ralph E. Kirk, manager of raw materials for Tennessee Coal & Iron Div. of U. S. Steel, a director of the institute.

Dividend . . . AMERICAN BRAKE SHOE has declared a quarterly dividend of 75¢ a share on the common stock, payable Dec. 31.

New Transistor . . . PHILCO CORP., Philadelphia, has developed a new type transistor which operates at high frequencies and with low power consumption—requirements which have limited the use of transistors up to now to hearing aids and devices where stability is relatively unimportant.

Theme Song . . . GENERAL ELECTRIC CO.'S Productive Maintenance program will provide the theme for its exhibits at the 5th Plant Maintenance Show in Chicago's International Amphitheatre Jan 25-28.

Eastern Rep. . . . THE ELLCON CO., New York, has been appointed exclusive eastern representative for the sale of electric steel castings for railroad and industrial use by West Steel Casting Co., Cleveland.

Service Offered . . . METALLURGICAL CONSULTANTS, INC., has opened an office and laboratory offering industry a metallurgical staff service for consultation, research, and development in the field of industrial materials and processes at 5821 E. Randolph St., Los Angeles.

In Effect . . . DAMASCUS TUBE CO., Greenville, Pa., has appointed Industrial Formed Steels, Inc., Warren, Ohio, as its representative.

Housewarming . . . LATROBE STEEL CO., Latrobe, Pa., held an open house party earlier this month at its newest tool steel warehouse at 741 Ramsey Ave., Hillside, N. J. Some 500 guests, most of them tool and die steel users, attended the housewarming.

Atom Talks . . . Foreign and U. S. experts will discuss peacetime uses of atomic energy in an INTERNATIONAL NUCLEAR ENGINEERING CONGRESS at University of Michigan from June 20-25, 1954.

Mexican Mill . . . BLAW-KNOX CO.'s Lewis Machinery Div., Pittsburgh, has received a contract for a combination rod and merchant mill to be installed for Cia Fundidora de Fierro y Acero de Monterrey, S. A., at Monterrey, Mexico.

Plant Addition . . . ROCKWELL MFG. CO., Pittsburgh, is building a 25,000-sq-ft addition at its Norwalk, Ohio, plant to house production of its smaller balanced valve gas regulators.

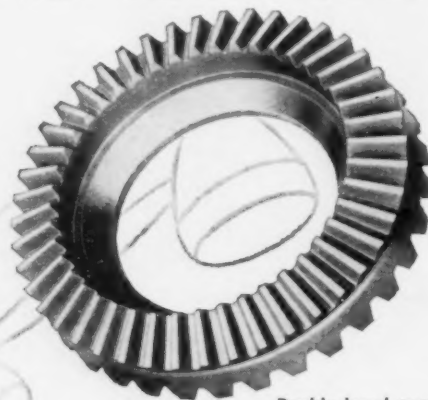
50 Years . . . CATERPILLAR TRACTOR CO., Peoria, will commemorate the 50th anniversary of the world's first practical track-type tractor in 1954.

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Bramble 7700 is our telephone number in Cincinnati. If you have a gear problem, call us—we would enjoy discussing it with you. We have been helping industry since 1907, and we can undoubtedly help you, too.

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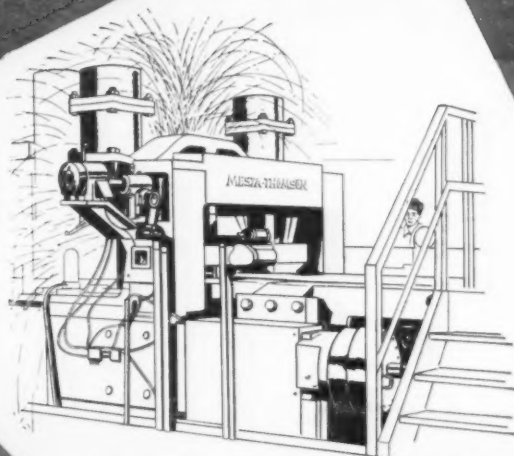
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The Automotive Assembly Line

Sales Race Revives Looks-Power Feud

Long standing auto industry argument on engine vs styling to get new data from Ford-Chevvy race . . . Both keep former styling, but Ford has new engine—By R. D. Raddant.

Which is more important in auto sales, the engine or the styling?

This question is as old as the auto industry itself and probably never will be answered to everyone's satisfaction. But straws in the wind may contribute some documentation to the case during the next year.

Give It Guts . . . Head of one of the Big Three was asked in general conversation recently how he would change a car if given a clear choice between a new body and a new engine, assuming equal need for both.

"I'd put the guts in it," he said instantly. But this rule has not always been followed in his own corporation where some divisions are leaders in horsepower while others lag. Since there is no rule of thumb a large corporation usually attempts to play both sides.

Body Tooling High . . . The successful car has both styling and a good engine, but tooling costs prohibit complete body restyling in less than 3 or possibly 2 years. On the other hand some engines have been literally old enough to vote before scrapping. Consequently, no single make can keep up with the latest at all times.

A significant test in the sales value of a new engine will come up soon with announcement of the new Chevrolet this week and the forthcoming release of the 1954 Ford. Neither Ford nor Chevrolet will have a new body, but this will be Chevy's second year with the same basic styling and Ford's third. Ford will have an entirely new engine while Chevrolet will continue, probably for the last year, its 6-cylinder engine.

Add Luxury Features . . . Chevrolet has souped up its old engine to 125 hp, which shouldn't be too far behind the new Ford powerplant, not yet disclosed officially. And Chevy is sprucing up generally to meet a major sales effort by Ford on the strength of its entirely new engine.

One of Chevrolet's most significant moves is to bring so-called luxury features to the low price bracket, although as optional equipment. These include power brakes, electric front seat adjustment and electric front window lifts. Chevrolet was the first in its class to introduce power steering and automatic transmission.

Styling, of course, is a matter of opinion, so there isn't exactly a clearly defined issue between Chevrolet's styling and Ford's new engine. But, any inroads Ford might make in the market next year would reflect the sales value of its engine.

Do Engines Help? . . . The horsepower race has given engines new

glamour and the trend to the overhead valve V-8 will no doubt continue until it covers the industry. Everyone has to concede that a car must be adequately powered to hold its own in competition.

But recent auto history shows few concrete cases where introduction of a new engine in itself showed really major sales results. On the other hand, there have been substantial increases in auto sales and even in automotive stock prices that can be attributed to a successful styling change.

It should be repeated again however that styling is strictly a matter of opinion. Styling flops in the past have put some car makers close to financial ruin, which probably no new engine ever did.

Who Influences Design? . . . Among automotive stylists a small war is going on between those who favor the European influence and those opposed to anything Continental.

Unusual part of it is that in spite of the tremendous strides made in styling here, there is no such thing as a recognized American styling school or cult. In contrast, European stylists have received much attention in recent years, probably more than their actual influence has deserved.

Credits Italians Only . . . George Romney, executive vice-president of Nash—a leading adaptor of European styling—claims that only the Italian school of auto design is having any real influence on U. S. cars. Because of economic conditions, the Italians have designed small cars with clear lines that have an undeniable appeal to the sports car crowd.

He discounts French, German and British styling influences as negligible, points out that only the custom-built European cars have attracted favorable attention here. Mass-produced European cars are usually undistinguished



from the esthetic point of view. In this regard, U. S. assembly line techniques forbid complete freedom of expression to the stylist although in the current competitive market he is having more his own way.

Stresses Aircraft Influence . . .
Carl W. Sundberg, Detroit industrial designer, says it is unsound thinking to Europeanize the appearance of American cars by all-out copying of foreign styling. Mr. Sundberg believes that aeronautical design will have a more lasting influence on future auto styling as designers attempt to smooth out lines, cut down on trim and include air scoops in car bodies.

Mr. Romney believes the American car of the future will "embody the sculptural simplicity and modern functionalism of postwar Italian design, without sacrificing the comfort and convenience of American family cars."

Plan High First Quarter Output

On the production line, it should be noted that GM divisions are scheduling from 10 to 15 pct higher production in first quarter 1954 than for the same period of 1953 while Ford schedules are perhaps even higher by comparison.

At the same time, there are indications that 1954 model runs may be shortened to provide for an early introduction of 1955 cars in the fall. There are many indications that both dealers and automakers would like to go back to the prewar scheduling which provided a more level sales year.

Meanwhile, Ford is finishing up a last half production surge that is unprecedented in the industry. The competition contends it has been at the expense of blitz sales and other tough sales practices, but Ford apparently went all out in the difficult late part of the year to strengthen position at all cost.

A company spokesman said that Ford production accounted for 21 pct of the industry in the first half, went to 23.6 pct in July, 27 pct in August, 30 pct in September, 31 pct in October and approached 32 pct

in November. This does not reflect sales, but by any evaluation it should result in a sizable increase in market percentage.

New Model:

Pontiac Star Chief features 213.7 in. overall length.

In new model developments, Pontiac also introduces its 1954 cars this week. Outstanding from the news point of view is a completely different line, the Star Chief, which is nearly a foot longer than other models—11 in., to be exact.

While the wheelbase, 124 in., is only 2 in. longer than Chieftan models, extension of front and rear overhang give it the much longer overall length. Total length is 213.7 in.

Just how big a car the Star Chief is can be seen by comparisons with these overall lengths of 1953 cars: Cadillac 62, 215.8 in.; Chrysler New Yorker, 211 in.; Lincoln, 214 in.; Packard Clipper, 213.1 in. Four body types are offered in the new series—Custom Catalina,

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Dec. 12, 1953..	88,284*	20,030*
Dec. 5, 1953..	101,996	21,142
Dec. 13, 1952..	91,806	29,784
Dec. 6, 1952..	98,505	30,500

*Estimated. Source: Ward's Reports

Custom 4-door, DeLuxe 4-door, and convertible.

Otherwise, Pontiac's model change might be included with the faceliftings. A new feature is an optional comfort seat control, which is not mechanically powered but nevertheless moves into 360 different front back seat positions with amazing ease including 36 tilt positions.

Also new with Pontiac is an air conditioning unit made by GM's Harrison Radiator Div. which is entirely enclosed in the front end of the car. This is in contrast to the units introduced in other GM divisions in 1953 models which have a large unit in the trunk, air scoops on the side of the car, and ducts running through the interior.

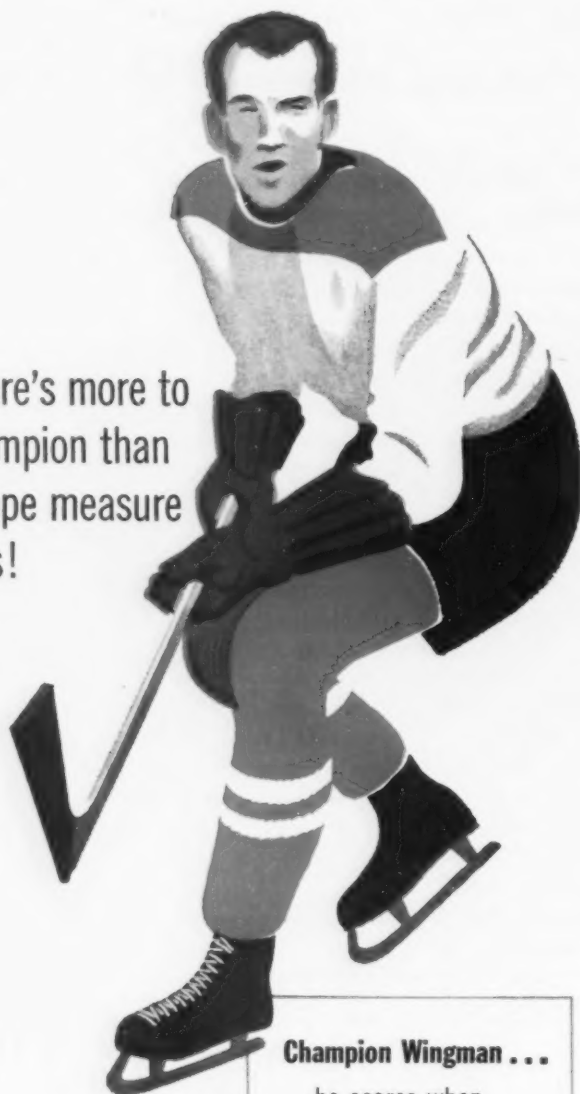
THE BULL OF THE WOODS

By J. R. Williams



IT'S PERFORMANCE THAT COUNTS

...there's more to a champion than the tape measure shows!



Champion Wingman ...

he scores when the pressure's on.



Average Wingman ...

he may measure the same—but he's stopped in the close ones.

HARDTEM DIE BLOCKS perform like "champions" in your production line!

Heppenstall Die Blocks perform like champions because they possess those extras that result in superior performance on the job. Their patented steel

analysis resists softening and heat checking in service. Records from Plants using Hardtem Die Blocks prove the following benefits for production.

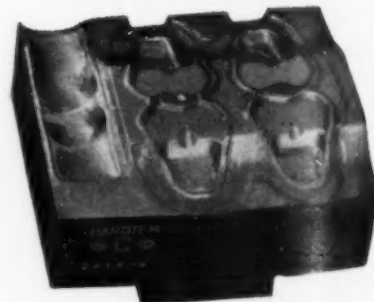
- ★ Long Life of Dies ★ Holding of True Dimensions
- ★ Longer Production Runs ★ Lower Overall Die Cost
- ★ Reductions in Down Time

It will pay you to try Hardtem Die Blocks. Call Heppenstall Company, Pittsburgh 1, Pa. Sales offices in principal cities.



Heppenstall

... the most dependable name in die blocks



Push Sale of Federally-Owned Business

Congress plans curbing government competition with private enterprise . . . Federal businesses tie up \$30.5 billion in taxpayer funds . . . Sale could balance budget—By G. H. Baker.

Congress is giving fresh thought to plans for getting the Federal Government out of competition with private enterprise. The reason: A new inventory of government investments in business activities shows that the taxpayers have about \$30.5 billion tied up in various financial and industrial enterprises which often compete with private business.

Income realized from sale of these enterprises would not only bring the federal budget into balance, but also would provide a surplus that could pave the way to widespread tax reduction and realistic retirement of part of staggering \$275 billion public debt. Withdrawal from some projects will of course be difficult.

Had Some Success . . . Joint efforts of the Eisenhower Administration and the Congress to get the government out of business this year have been only moderately successful. Secretary of Commerce Sinclair Weeks sold the deficit-ridden Federal Barge Lines to private waterways operators, and Congress passed legislation designed (but with many restrictions) to sell the government-owned synthetic rubber industry.

The Navy, after much prodding by Congress to unload its swollen inventories of surplus or obsolete stores, announced last week it had tagged \$289,577,000 worth of goods in inventory for disposal. Of these stocks, \$97,055,000 worth will be sold outright by bid. Remainder will be sold after other federal agencies have had first call on it.

Tax Selected Items . . . Any new taxes voted by Congress this year will be in the nature of excises on selected manufactured products,

and will not take the form of across-the-board levies at the manufacturing or retailing levels. It is entirely possible, however, that Congress will turn thumbs down on all new tax proposals.

Plans for enacting either a national manufacturers' tax or a retail sales tax will highlight congressional debate next month on the Eisenhower Administration's revenue problem, but a check of political opinion at the Capitol suggests that a majority of Senate and House members are prepared to vote a flat "no" on each of these two sales tax proposals.

Broaden Excise Taxes . . . The Administration's search for new revenue has started speculation that Congress may vote federal excises for some products not now taxed, such as household furniture, clothing, carpeting, and house-

wares. While it is considered very doubtful that excises will be tagged to any of these products next year, there is much discussion under way at the Treasury and among members of the two Congressional tax-writing committees concerning the advisability of voting these new excises.

The Administration has thus far been playing its tax-program cards very close to its vest. President Eisenhower has stated only that his tax recommendations to Congress in January will call for less, not more revenue. And Under Secretary of the Treasury Marion Folsom declines to go beyond stating that the principal aim of the tax program is to stimulate industrial growth and to wipe out existing inequities in the tax laws.

Because many of the planned revisions entail losses of revenue, the Treasury plans to omit asking for too much revision in one package.

Can Punish Disloyalty . . . Employees who ridicule or disparage their employer's product may properly be fired, and nothing in the Taft-Hartley Act requires their employer to reinstate them, the U. S. Supreme Court ruled last week.

In a 6-3 decision, the court held that disloyalty to an employer is a lawful cause for dismissal. Justice Harold Burton, who signed the majority opinion, stated:

"There is no more elemental cause for discharge of an employee than disloyalty to his employer. It is equally elemental that the Taft-Hartley Act seeks to strengthen, rather than weaken, that cooperation, continuity of service, and cordial contractual relation between employer and employee that is born of loyalty to their common enterprise."

The case grew out of the firing of ten television broadcast technicians by WBTV, Charlotte, N. C. The workers circulated handbills criticizing their employer's programs.

What It Costs

Some idea of the extent to which the Federal Government competes with private enterprise can be gained from this summary of how the taxpayers' money is now invested:

	Million
International Credit	\$3,217
Bank Deposit Insurance	1,613
Farm Credit & Insurance	4,429
Housing Credit, Loan	
Guarantee, Insurance	4,903
Electric Power	
& Distribution	4,326
Financing Co-op	
Power Prod. & Dist.	2,122
Atomic Energy Production	7,706
Misc., incl. Military	1,023
Agencies in Liquidation	1,140
Total	\$30,479



If...the average Lyon Steel Equipment Dealer dressed to represent every kind of customer he serves—he'd be wearing quite an outfit!

for Lyon makes over 1500 different items—serving hundreds of markets including factories, shops, offices, warehouses, schools, churches, hospitals, clubs, institutions and homes.* (A very few typical Lyon Products are shown below.)

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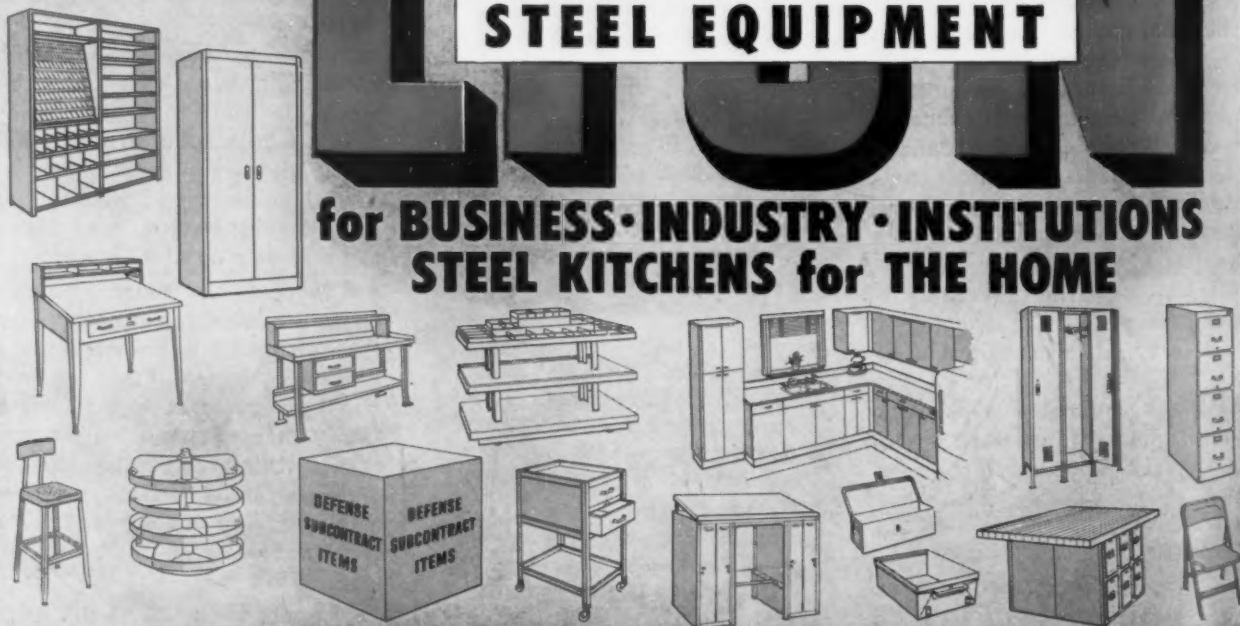
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|-------------|--------------------|---------------|------------------------|---------------------|-------------------|-----------------|---------------|
| • Shelving | • Kitchen Cabinets | • Tool Toters | • Economy Locker Racks | • Display Equipment | • Filing Cabinets | • Service Carts | • Tool Stands |
| • Lockers | • Cabinet Benches | • Bar Racks | • New Freedom Kitchens | • Flat Drawer Files | • Folding Chairs | • Sorting Files | • Shop Boxes |
| • Stools | • Storage Cabinets | • Tool Boxes | • Toolroom Equipment | • Revolving Bins | • Work Benches | • Drawer Units | • Tool Trays |
| • Bin Units | • Drawing Tables | • Parts Cases | • Wood Working Benches | • Hanging Cabinets | • Bench Drawers | • Hopper Bins | • Shop Desks |

Report Fewer Strikes in October

Social Security:

Radio:

Suppose the Firm Made Yachts

95

Cuts Production Costs \$11,549 a year

Penn Electric Switch Co.
saves \$7,345 per year
on scrap loss alone
with one 4-ton

MULTIPRESS®

Cuts scrap loss \$7345.00 per year.

Doubles production rate to 400 units per hour.

Assembles two different magnetic switches in continuous 5 to 1 ratio.

Using dual punches that stake five metal parts in a bakelite base with each ram stroke, the Multipress at right cuts scrap loss more than 80 per cent.

In addition, it speeds production to twice the former rate without additional labor time.

These savings on scrap and labor bring Penn Electric Switch Company a yearly gain four times the cost of the complete Multipress, accessories, and tooling.

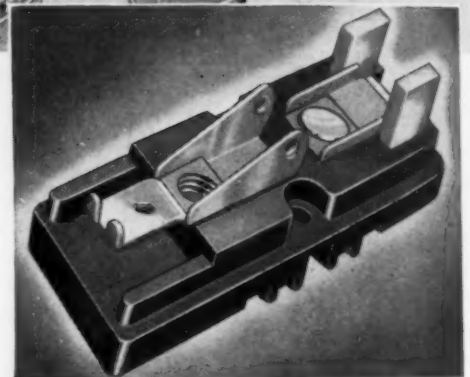
Operators prefer Multipress, too, because it's quieter, safer and easier to operate, and smoother in action than previous press equipment.

The Multipress is a 4-ton model with a 6-station Multipress Indexing Table. Operators simply place the magnetic switch parts in holding fixtures at each of the six stations.

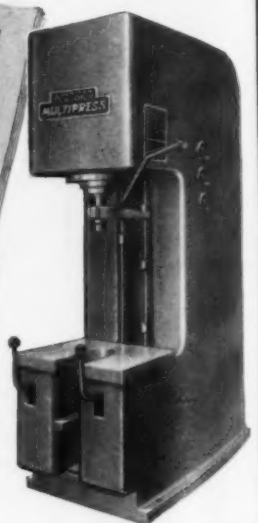
The Multipress ram delivers precisely the same pressure with each stroke—a major advantage of oil-smooth hydraulic action in reducing scrap losses. This avoids damage to bakelite bases thicker than average, and prevents loose fittings on bases of less than average thickness. An equalizing head on the ram tooling assures uniform pressure on the two punches.

A cam track within the table housing provides a means for lifting finished parts out of the fixtures. Then an air ejector blows the parts into a stove-pipe chute that carries them to the next operation.

This is another of the many factual stories of results manufacturers are getting with Multipress in every field—on a wide range of production jobs. Write for full details today... there's no obligation.



Penn Electric Switch Co., Goshen, Indiana,
Manufacturers of Automatic Controls.



MULTIPRESS is available in 9 frame sizes — 1 through 75-ton capacities

Standard Multipress accessories are available for many requirements . . . manual, push-button, servo, or automatic controls and a wide choice of ram actions. See your Denison Field Engineer or write.

THE DENISON ENGINEERING COMPANY, 1158 Dublin Rd., COLUMBUS 16, OHIO

West Coast Report

Coast Aluminum Salesmen Smile Again

California white metal sales swing up after 2 to 3 month lean period . . . December distributors' tonnage to be 5 to 10 pct over November . . . Rehire workers—By T. M. Rohan.

A good many western aluminum salesmen were wreathed in smiles last week—in sharp contrast to the gloom pervading other metal producers.

Sales offices in California reported a decided upswing last week in orders from distributors—closest link to a host of small metalworking shops. Fat order books followed a lean 60-90 days for most salesmen.

An Aluminum Co. of America office in California said distributors' tonnage for December will probably be 5-10 pct better than November which, in turn, was better than October.

Reynolds Metals in California reported sales last week highest in over a month—especially in its new double width (48 in.) corrugated sheets—first in the industry—introduced in the area in July.

Rehire Workers . . . Kaiser announced rehiring of 200 of 600 workers at the Trentwood, Wash., rolling mills laid off Oct. 27 and Nov. 3 due to distributor inventory pile-up. Reason for the recall was a "definitely improved sales picture." Kaiser also is the second to jump into the 48-in.-wide corrugated sheet field with orders now being taken for delivery in February. Corrugating dies have been ordered for the Trentwood sheet mill with production expected to start as soon as installed—probably in late January. First gages will be 0.019 and 0.024 in.

Alcoa reported distributor orders have jumped the last few weeks after a "wait and see" period following lifting of restrictions on their inventories.

Multi-Million Cable . . . At Alcoa's Vancouver, Wash., mill, ship-

ment was starting on one of its biggest orders, \$4 million worth of transmission cable for Bonneville Power Administration. Alcoa's cable mill addition has been completed and now awaits only equipment to start production. The new extrusion mill there—now upped in price from originally estimated \$2.7 million to \$3.3 million—is being rushed ahead with start-up set for mid-1954 accompanied by a major celebration.

The extrusion mill will add 250 fabrication workers—a welcome addition to satisfy area clamor for more local fabrication employment per kilowatt consumed. Only lay-off has been 29 holdovers from summer rush season.

Reynolds reported over 500 tons of 48 in. corrugated sheets have been sold in the West since introduction in July. They now account for almost 85 pct of the company's sales in industrial and rural roofing materials. Savings in labor and materials have been major sales clincher.

Dams Full . . . Continued heavy rainfall in the Northwest prom-

ises a banner year for primary aluminum reduction plants. Some dams are spilling water and floods were reported last week in some sections of the Willamette river in Oregon. Only dent in production was carryover of power reduction through early January this year.

Warehouse Expands . . . With most other western warehouses pulling in their horns, Ziegler Steel Service Corp. of Los Angeles last week got ready for an all-out sales effort. With completion of a \$100,000 new warehouse and office to double area to 30,000 sq ft, Pres. Herbert Zeigler announced appointment of four new sales offices in Portland, Wichita, Dallas and Phoenix with one additional office planned, bringing the total to nine.

The 8-year-old firm claims to have the largest aircraft quality sheet and strip stock in the U. S. Sales this year will hit over \$2 million, slightly above last year's \$2 million and under banner 1951's \$2.5 million. Pres. Zeigler said 1954 looks "moderately rosy" for California warehouses and added "now's the easiest time to expand and turn on sales pressure while others are in a defensive mood."

Want Optional Writeoffs . . . American Machine Tool Distributors Assn. carried its fight for optional depreciation on industrial machinery to the West last week. R. A. Vidinghoff of Philadelphia, representing the association, told 45 San Francisco area industrialists they should be permitted to determine their own writeoff period on the basis of each operation.

He added there would be little immediate loss of tax revenue and no long-term loss provided rates are constant. An optional writeoff would be added incentive to manufacturers to buy new equipment which in turn would keep national productivity high.



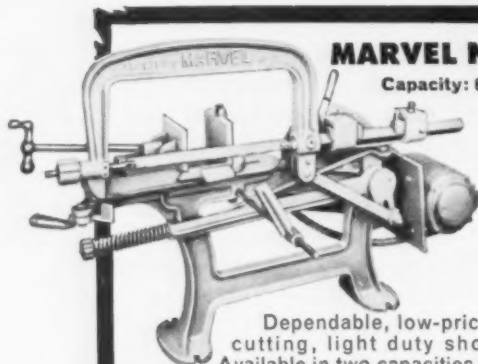
"You'll have to bring your son in for a loyalty oath."

WHAT DO YOU WANT IN A METAL-CUTTING SAW?

-ECONOMY, SPEED, VERSATILITY, CAPACITY

Whatever your individual requirements in metal-cutting equipment, MARVEL has it. MARVEL builds nine basic types of metal sawing machines, each available with a choice of modifications and special accessory equipment.

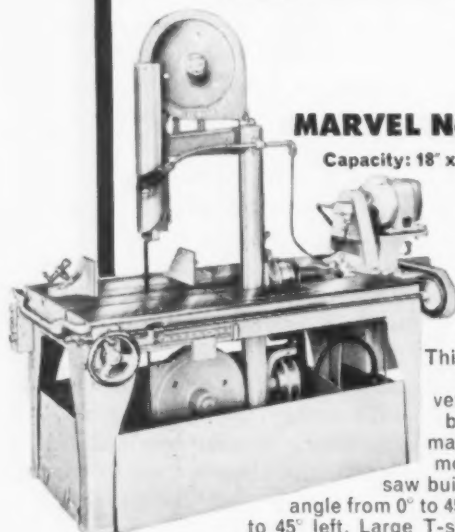
Your local MARVEL sawing engineer is competent to study your cut-off and metal sawing problems, and to make recommendations as to the most advanced methods and equipment.



MARVEL No. 2/M1

Capacity: 6" x 6"

Dependable, low-priced, dry-cutting, light duty shop saws. Available in two capacities, 6" x 6" or 4" x 4", belt or motor drive, stationary or portable.



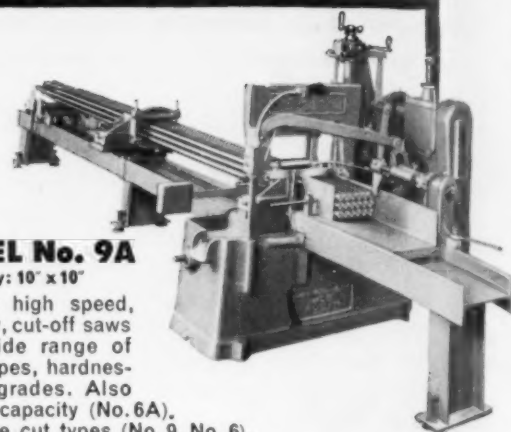
MARVEL No. 8

Capacity: 18" x 18"

This universal, advancing vertical blade, band sawing machine is the most versatile saw built. Cuts any angle from 0° to 45° right to 0° to 45° left. Large T-slot bed and many other features.



Write for catalog



MARVEL No. 9A

Capacity: 10" x 10"

Automatic high speed, heavy duty, cut-off saws handle wide range of sizes, shapes, hardneses and grades. Also with 6" x 6" capacity (No. 6A), or in single cut types (No. 9, No. 6).



MARVEL No. 18

Capacity: 18" x 18"

Universal, hydraulic, heavy duty roll stroke hack saw. Cuts off largest and toughest bars and billets; easily, rapidly and accurately. Trims die faces for resinking, does shanking of die blocks, etc. Also available in 24" x 24" capacity (MARVEL No. 24).

MARVEL High-Speed-Edge Hack Saw Blades

Unbreakable, composite saw blades with fastest-cutting, longest-lasting high speed steel edge integrally welded to a tough unbreakable body, permit maximum speeds and feeds on any hack sawing machine. Permit tauter tensioning—Increase accuracy. Outlast all other blades.

MARVEL High-Speed-Edge Hole Saws have strength not only for portable drills, but for use on drill presses, lathes, etc. Sold by leading industrial distributors.



ARMSTRONG-BLUM MFG. CO. 5700 W. Bloomingdale Ave., CHICAGO 39, U.S.A.

Machine Tool High Spots

Focus on Better Grinding, Machining

Industry spending \$2.25 million to improve methods of machining, grinding metals, dies, cemented carbides . . . Progress made, new developments—By E. J. Egan, Jr.

About \$2.25 million will be spent by industry this year to develop new processes for machining and grinding metals, dies, cemented carbides and non-metals. This is almost twice the amount spent on this type of research in 1951 when the diamond bort shortage stimulated keen interest in conservation methods.

Progress industry has made in improving machining and grinding methods is evaluated in report by Minerals & Metals Advisory Board of the National Research Council.

What's Being Studied . . . Processes being investigated by industry are grouped in six classes: (1) Electro-discharge processes (including electro-sparking and electro-arc); (2) Electrolytic processes; (3) Ultrasonic abrasive grinding; (4) Silicon carbide belt grinding; (5) Silicon carbide wheel grinding; (6) Diamond wheel grinding.

Largest share of research funds are going to improve electro-discharge methods. Emphasis in this field is on developing and testing equipment for shaping and finishing dies. Significant advances have been made in improving the quality of finishes, compatible with high rates of stock removal.

Save Diamond Bort . . . There has been almost a ten-fold increase in the amount being spent on development of new electrolytic processes during the last three years. Field tests are concentrated mainly on electrolytic methods of sharpening single-point tools. These methods still require use of metal-bonded diamond wheels, but results indicate possible 60 to 95 pct savings of diamond bort. There

are less than 100 ultrasonic abrasive grinding machines now in shop use or undergoing field tests, according to the report; but this is triple the 1951 figure. Most applications are of a miscellaneous nature, but some advances have been made in sharpening single-point tools and grinding chip breakers.

Placed in Production . . . More than 300 silicon carbide belt grinding machines were placed in production shops during the past year for finishing cemented carbide single-point tools. It is expected that this application will continue to grow as improvements are made in grains, bonds, machines and techniques.

Silicon carbide wheel grinding has been used extensively during the past year and a half for roughing operations on single-point tools. This method is limited, however, to applications where the volume of grain in the wheel is

high compared to the area of work being ground.

Serves as Standard . . . Diamond wheel grinding is in full production use and serves as the standard for determining the merits of new methods. Research in diamond wheel grinding shows promise of conserving diamond bort through development of superior bonds and methods of grain insertion, and through more extensive application of new coolant techniques.

There is ample evidence that industry is bringing new machining and grinding methods out of the experimental stage and is using them for limited production and in field tests. Trade acceptance of new processes is slow, but nevertheless the progress that has been made is encouraging.

The accompanying chart from the Advisory Board report shows the applicability of the new methods to the usual machining and grinding operations on different materials. These ratings do not cover factors such as cost, performance, equipment availability or general trade acceptance which are of course extremely important considerations.

Will These New Methods Do the Grinding Job?

Machining & Grinding Operation	Electro-discharge	Electrolytic	Ultrasonic Abrasive	Silicon Carbide Belt	Silicon Carbide Wheel	Diamond Wheel
Cemented Carbides	Yes	Yes	Yes	Yes	Yes	Yes
Metals (e.g., steel)	Yes	Yes	Yes	Yes	Yes	No
Non-Metals	No	No	Yes	Yes	Yes	Yes
Large Areas (over 4 sq in.)	Yes	Yes	No	Yes	?	Yes
Small Areas (under 4 sq in.)	Yes	Yes	Yes	Yes	Yes	Yes
Small Diam. Deep Holes	Yes	No	Yes	No	No	No ¹
Cut-off	Yes	Yes	Yes	No	Yes	Yes
Embossing	Yes	No	Yes	No	No	No
Off-hand	²	Yes	?	Yes	Yes	Yes
Fixed Feed	Yes	Yes	Yes	Yes	Yes	Yes
Form Grinding	Yes	Yes	Yes	No	Yes	Yes
Tapping	Yes	No	Yes	No	No	No

¹ Loose diamond powder can be used for small diam. deep holes, but not wheels.

² Recent developments indicate that off-hand grinding by electro-discharge techniques is practical but it has not as yet been fully proven in the field.

Source: Minerals & Metals Advisory Board Report No. MMAB-54-C.

Where the going is **TOUGH** . . .

**SPECIFY
FARREL®
GEARS**



Precision generation combined with the use of highest grade materials gives Farrel herringbone gears the ability to withstand the heaviest shock loads encountered in machine applications.

Accuracy of tooth contour and tooth spacing, overlap or interlacing of the teeth, gradual engagement and inclined line of pressure contribute to smooth operation and maintenance of correct tooth action throughout a long gear life. The opposed helices balance and absorb axial thrust within the gear member, preventing harmful thrust loads with

resultant stresses on other parts of the machinery.

Farrel engineers are available to assist in working out unusual gear problems. Information about herringbone gears, or any of the other types mentioned on this page, will be sent on request.

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Farrel-Birmingham®

HERRINGBONE GEARS

Farrel-Sykes herringbone gears are available in any size from 1/4 inch to 20 feet diameter, 1/4 to 60 inch face, 24 DP to 0.75 DP.



**STRAIGHT TOOTH
AND SINGLE
HELICAL GEARS**

Farrel also supplies straight tooth (spur) gears and single helical gears in any size from 1/4 inch to 20 feet diameter, 1/4 to 30 inch face, 24 DP to 0.5 DP.



INTERNAL GEARS

Large internal gears are available with either spur or helical teeth, in sizes up to 18 feet diameter, 12 inch face, 1 1/4 DP.



REPORT TO MANAGEMENT ..

Inventory
stabilizes

On a year-long uptrend, value of industry inventory now shows signs of stabilizing, and perhaps more definitely reversing direction in months ahead. So far, momentum of our expanded productive plant has buoyed up inventory. This has been contrary to the readjustment ebb in industrial activity, sales and new order rates, backlogs. Seasonally adjusted book value of business inventory in October '52--and it was somewhat difficult to fatten inventory then--stood just over \$74 billion. Fluttering upward throughout 1953, inventory value reached a shade over \$79 billion this October. To many executives, the \$5 billion gap was disquieting.

What
trends are

Reassuring even the pessimists is October's short inventory dip from a seasonally adjusted September figure of \$79,380,000,000. On an unadjusted basis, though, October registered a slight rise from September--but a fatter gain was usual. Mass drive of industry to carve down raw materials stocks is waning, but short term delivery is here to stay. Still having leeway for reduction, finished goods inventories will get more attention, especially from some durable goods makers. Because of sustained high demand, producers have ample time to pare these without bolting into retrenchment. Overall, inventories today are sound.

Hiring
rate dips

Decline of Federal Reserve Board's production index this November was preceded by an October dip of the factory hiring rate to 34 per 1000 against 40 per 1000 in September. Meanwhile, the layoff rate was on the incline for October, rising to 18 per 1000 compared with 15 per 1000 in September.

Make pay
facts known

Follow the advice of a few trade associations who are warning members to disabuse employees in certain pay classes of the belief that the coming income tax cut will automatically fatten pay envelopes. Increasing at the same time, social security taxes will partly nullify pay increases arising from the income tax cut. For many workers, take-home pay will rise so fractionally as to be a source of disappointment. Make these facts known.

Farm sales
to ease

A top executive of the farm equipment industry told Iron Age that 1954 sales may be below this year's (See p. 74). Immediate outlook for farm machinery may be a trifle bleary but long term strength is unabated. New products and the continuing need for labor saving equipment will reinforce sales in years ahead. In another major industry, steel, business is coming out reluctantly largely because of metalworking's inventory adjustment.

Retail sales
decline

November retail sales, as reckoned by Dept. of Commerce, sank 7 pct from October but still equalled the November '52 rate. Allowing for seasonal adjustment, November sales of almost \$14 billion were 2 pct above expectations for the month. Durables and nondurables showed more than seasonal strength though auto sales dipped 2 pct more than usual. Department store sales for November should finish at the 1952 level. Losses in the second half of the month were offset by gains during the first part.

Capital outlay
stays high

Brimming with optimistic forecasts, Commerce Dept. last week saw first quarter '54 business spending for new plants, equipment running at an annual rate of \$28 billion--or \$800 million over first quarter '53 and only \$300 million below this quarter. For all 1953, outlays will attain a record \$28 billion, or about \$1.3 billion over '52. The agency observes that spending may start to ease after next March.

COPPERWELD STEEL COMPANY

WARREN, OHIO



ROBERT S. CLINGAN
GENERAL MANAGER OF SALES

Director
Engineering Office
Company
Michigan

Sir:

Your order for cold drawn leaded 1140 annealed bars* was shipped today. You can expect the superior machining qualities of Ledloy to result in increased production, longer tool life and finer finishes.

As you are probably aware, the lead exists in this steel as well dispersed, submicroscopic particles in a pure form and has no effect upon its mechanical properties. Forgability, carburization, or heat treatment are, therefore, not adversely affected by the presence of the lead. Fortunately, too, there are no health hazards involved during the course of machining, heat treating, or normal handling.

Several users have reported increases of 30% to as high as 75% in machinability on production runs. This, they feel, is primarily due to the lessening of friction between the chip and the tool, which permits higher speeds without burning of the cutting edge. Similarly we feel sure that our lead steel alloy will substantially reduce your production costs and would appreciate comments on its use in your plant. If you would like any assistance or additional information regarding the application of lead steel to your products, our Field Representative will be pleased to assist you.

R. S. Clingan
R. S. Clingan
General Manager Sales

Copperweld also offers lead alloy and electric furnace steels in other standard analyses and in a variety of sizes and surface conditions. These include hot rolled and cold finished bars, annealed or heat treated. Bar finishes include cold drawn, ground or turned and polished, within our range of manufacture. Semi-finished products such as billets and blooms are also available for re-rolling or forging purposes.

HOW GRAPH-MO[®] HOLLOW-BAR CUTS COSTS OF RING-SHAPED TOOL STEEL PARTS

1. MACHINES 30% FASTER

Free graphite in Graph-Mo's[®] structure cuts machining time 30% over other tool steels. It has a minimum tendency to pick up, scuff, seize or gall. It's also the most stable tool steel ever made. A typical Graph-Mo steel master plug showed less than 10 millionths of an inch dimensional change in 12 years!

2. ELIMINATES DRILLING

With Graph-Mo Hollow-Bar, drilling is eliminated because the center hole's already there. Finish boring is the first step. You save machining time. Available in sizes up to 16" O.D. with a variety of wall thicknesses.

3. OUTWEARS OTHERS 3 TO 1

The combination of free graphite and diamond-hard carbides gives Graph-Mo unusual wear-resistance. Reports from users prove it outwears other tool steels an average of 3 to 1. And Graph-Mo responds uniformly to heat treatment.

4. MORE PARTS PER TON

You start closer to your finished product with Graph-Mo Hollow-Bar. You machine away a minimum of steel, cut scrap loss. Graph-Mo Hollow-Bar is distributed through A. Milne and Co. and Peninsular Steel Co. warehouses. For more information about Graph-Mo Hollow-Bar, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO."

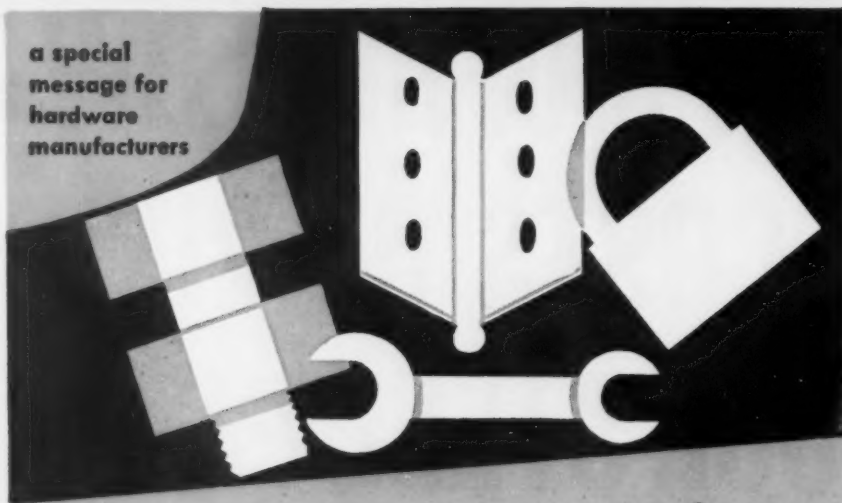
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

December 17, 1953

a special
message for
hardware
manufacturers



need a finish for protection—
decoration—identification? **specify**
IRIDITE®

Specify Iridite . . . for corrosion protection during storage or use . . . for a firm and lasting base for paint . . . for extra quality and eye-appeal . . . for low cost color coding of finished parts.

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

Iridite is approved
under government
specifications



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Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems
on Non-Ferrous Metals, ARP Plating Chemicals.
WEST COAST LICENSEE: L. H. Butcher Co.

Free Publications

Continued

Doors

Informative illustrated booklet describes Kinnear *Rol-Top* doors for commercial and industrial application. Kinnear door is in upward acting, sectional type or overhead category but offers distinctive *Keystone* sealing device. Separate catalog is also available on same general type of door constructed of galvanized steel door panels or sections. *Kinnear Mfg. Co.*

For free copy circle No. 12 on postcard, p. 101.

Industrial chemicals

New wall chart of industrial chemicals derived from oils and fats has been released by Chemical Products Div., Archer-Daniels-Midland Co. The 17 x 27 in. reference sheet charts the composition and specifications of all the standard Chemicals produced by company. Common uses for fat chemicals are listed alphabetically. *Archer-Daniels-Midland Co.*

For free copy circle No. 13 on postcard, p. 101.

Grinders

Gardner Machine Co. has released 28-p, 2-color catalog illustrating and describing full line of precision double spindle grinders. New edition includes redesigned models and data, including 16 representative types of Gardner work carrying features which can be adapted to these machines. *Gardner Machine Co.*

For free copy circle No. 14 on postcard, p. 101.

Console indicator

New electronic console indicator that saves panel space and helps an operator speed up the logging of thermocouple temperatures is completely described and illustrated in 4-p folder, *Log 200 Temperatures in Minutes*. Publication shows how design of Speedomax console indicator permits unobstructed view of whole control room panel during heat-balance checks, comparison checks of panel-mounted instruments and measurements of independent temperatures. Photographs illustrate design features. Folder also provides complete specifications, ranges and dimensions for three available types of indicator. *Leeds & Northrup Co.*

For free copy circle No. 15 on postcard, p. 101.

"with **GULF LASUPAR CUTTING OIL**
we get better finishes, longer tool life
on B-1113 steel parts"

says Guy Hack, Holt Products Co., Holt, Mich.



"Gulf Lasupar is the ideal cutting oil for high production-close tolerance work on automatics," says Mr. Hack. "Not only do we get longer tool life and better finishes, but we have found that this quality cutting oil provides corrosion-free lubrication of machine bearings."

Send the coupon below for a copy of the pamphlet "Gulf Lasupar Cutting Oil," which gives all the facts on how this outstanding cutting fluid can help you improve your machining practice.



Gulf Oil Corporation - Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.

1A

Please send me, without obligation, a copy of your pamphlet, "Gulf Lasupar Cutting Oil."

Name.....

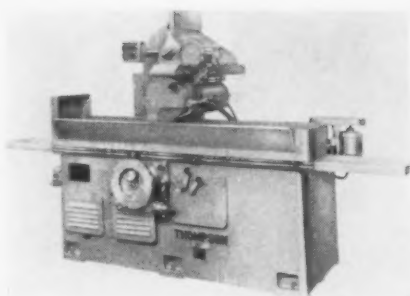
Company.....

Title.....

Address.....

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 103 or 104.

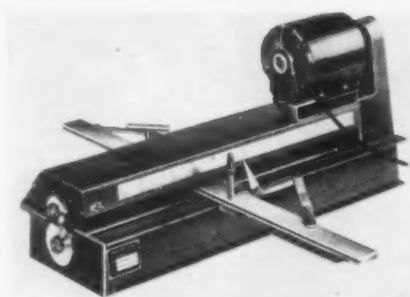


For all types, sizes of normal surface grinding jobs

New line of Type B hydraulic surface grinders range in 16 sizes from 6 x 18 in. to 12 x 120 in. Features include crossfeeding wheel head with horizontal spindle grinding with periphery of the wheel; accurate positioning of work; in-position wheel truing; simplified

controls and control panels; smaller increments of downfeed and wider increments of crossfeed for quality finish; flame hardened cross slide ways; integral motor drive to wheel spindle; automatic lubrication. *Thompson Grinder Co.*

For more data circle No. 16 on postcard, p. 103.



Portable metal shear slits 20 gage mild steel

New bench model portable metal slitting shear embodies all the engineering refinements and performance qualities of the heavy duty Wilder shears. It will slit up to 20 gage mild steel at 62½ fpm, at tolerances of 0.005 in. or less, with minimum distortion. With net weight

of 72 lb it can be carried by one man to the job; plugs into any 110 v outlet. Power driven blades are machined from high carbon, high chrome tool steel, and are hollow ground and reversible for double life. *Wilder Mfg. Co.*

For more data circle No. 17 on postcard, p. 103.

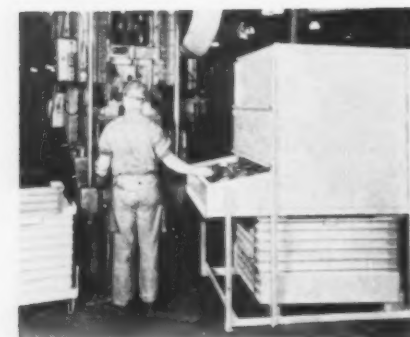


Produces compound curves on magnesium skins

New stretch forming press, developed to produce compound curves on magnesium skins, is a self-contained machine with a shell die made of sheet steel ranging from 0.074 to 0.125 in. thickness and combining thermostatically controlled heat. The metal is placed over the die, locked into the jaws, (cam actuated if desired) and lock bolts tightened. Then the heat is turned on. Operator controls the

amount of stretch by operation of a hand, hydraulic or motor driven pump until the metal is completely curved to the die specifications. Pyrometer reading provides operator constant heat control. The whole process takes less than 20 min. Handling throughout is clean, efficient and safe and inexperienced labor can operate the machines. *R. A. Lalli Co.*

For more data circle No. 18 on postcard, p. 103.



Mass material storage provided at use point

Mass material supply at work-level position is provided by a new Work-O-Matic gravity-fed hopper. It has capacity of 47.2 cu ft and is portable. When a loaded drop bottom box is stored under the hopper, total vertical material supply volume at the work station is increased to 67.4 cu ft. The hopper easily can be fork-lifted to differ-

ent work stations. A fork truck can quickly and safely drop bottom dump the contents of the Work-O-Matic box into the hopper from any one of eight directions. Vertical control gate governs material flow according to piece size. *Union Metal Mfg. Co.*

For more data circle No. 19 on postcard, p. 103.

Turn Page

WITH A BLANK OF STAINLESS STEEL...

GET THESE RESULTS BY

Hydroforming

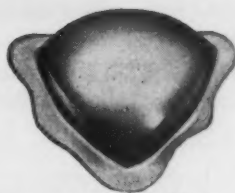
DEEP DRAW IN 1 OPERATION



5½" High—4 ¼" Dia.
COVER OF .035"
TYPE 305 STAINLESS

Drawn to depth indicated with recessed top in 1 operation.

PRESERVE SURFACE FINISH



4" Sides
CORNER BALL OF 20 GA.
TYPE 302 STAINLESS

Pre-polished blanks coated with protective plastic were drawn to shape with plastic coating completely intact.

HOLD CLOSE TOLERANCES



1 ½" Dia.
DIAPHRAGM OF .010"
TYPE 304 STAINLESS

Two parts mate with an air-tight fit.

FORM INTRICATE SHAPES



6" Long—3" Tee section
MANIFOLD OF .040"
TYPE 347 STAINLESS

Short-run aircraft part formed using Kirksite punch in 1 operation.



3" Long—1 ½" Wide
CROSS-OVER DUCT OF .035"
TYPE 321 STAINLESS

Drawn with contoured flange in 1 operation.



3" High—8" Long
JET-ENGINE DUCT OF .032"
TYPE 321 STAINLESS

Shape with open ends, having intricate surface detail, formed in 1 operation with minimum springback.

With the tremendous power available, the cold drawing and forming of stainless steels present no problem to the Hydroform. With its unique drawing action and continuously controlled forming pressure, most parts are drawn in a single operation.

Tool costs are reduced 70% or more, as a male punch and a simple draw ring are the only tools required. Expensive die sets, with their attendant

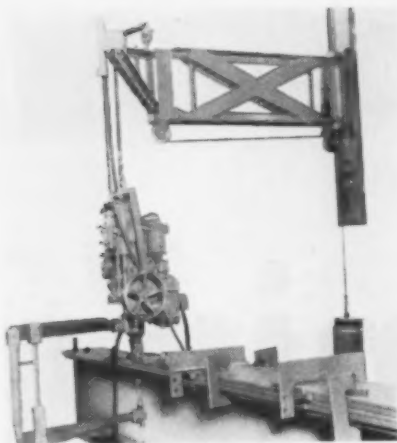
high maintenance costs, are eliminated. The cushioned action of the flexible die member forming the material to the punch reduces punch wear and minimizes the possibility of galling.

Contact your nearest Cincinnati Milling field engineer for complete details on Hydroforming. For a description of the five sizes of Hydroform machines, write for Bulletin M-1759-2.



Hydroform

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U.S.A.

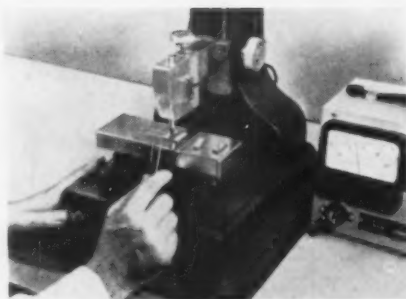


Automatic beam and girder drill saves labor costs

Portable drilling machine can work from any position around large, unwieldy steel beams, girders and weldments. The machine is operated by pushbutton and automatically drills holes up to 2 in. in diam. Suspended from a crane or other overhead structure, the machine is quickly and easily moved over and around cumbersome workpieces too bulky to be handled on conventional metalworking equipment. The drill penetrates steel on a line perpen-

dicular to the surface or surface tangent. Operation is simplicity itself so that little training is needed. The operator moves the drill head over a punch mark in the steel surface and locates drill point by means of a hand wheel. The drill head automatically clamps to structure and drilling of hole starts. After hole is drilled the drill withdraws automatically. *Artos Engineering Co.*

For more data circle No. 20 on postcard, p. 103.



Micro-ac checks dimensions to 0.0000005 in.

Dimensional gaging in increments of one-half-millionth of an inch is provided by the micro-ac electronic microcomparator. The instrument consists of an induction-type gage head with frictionless movement, adjustably mounted on a rigid stand, and a drift-free industrial type amplifier with a meter. Two

continuous linear scales read 0.0000005 and 0.000001 in. per division, either side of center zero; and the respective measurement ranges are 0.000010 and 0.000020 in. The two scales can be used interchangeably at will. *Cleveland Instrument Co.*

For more data circle No. 21 on postcard, p. 103.

MAY-FRAN

ENGINEERED SCRAP HANDLING

1047-MF



ELIMINATES SHUT-DOWNS

Remove scrap automatically and continuously . . . speed up production . . . with a MAY-FRAN automatic handling system. MAY-FRAN CHIP-TOTES remove chips, turnings and borings from operating machine tools . . . eliminate down-time for manual scrap removal. MAY-FRAN hinged steel belt conveyors then transmit scrap to disposal point or through shearing and baling processes.

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Lapping machine uses figure 8 motion

A bench type lapping machine built by Rhinevault utilizes the figure 8 lapping motion. It operates at four surface speeds of 250 to 1000 ipm as the 1/3 hp driving motor connects to the mechanism by a V belt and step pulley. Serrated or smooth 8x12-in. lap plates of cast iron are used and are easily inter-

changeable. Plates of other materials can be supplied. Surface tolerances of less than 11.6 millionths of an inch are said to be obtainable on most materials in a matter of minutes. Brackets allow for hold-down devices for lapping multiple piece or angled surfaces. *Lopon, Inc.*

For more data circle No. 22 on postcard, p. 103.



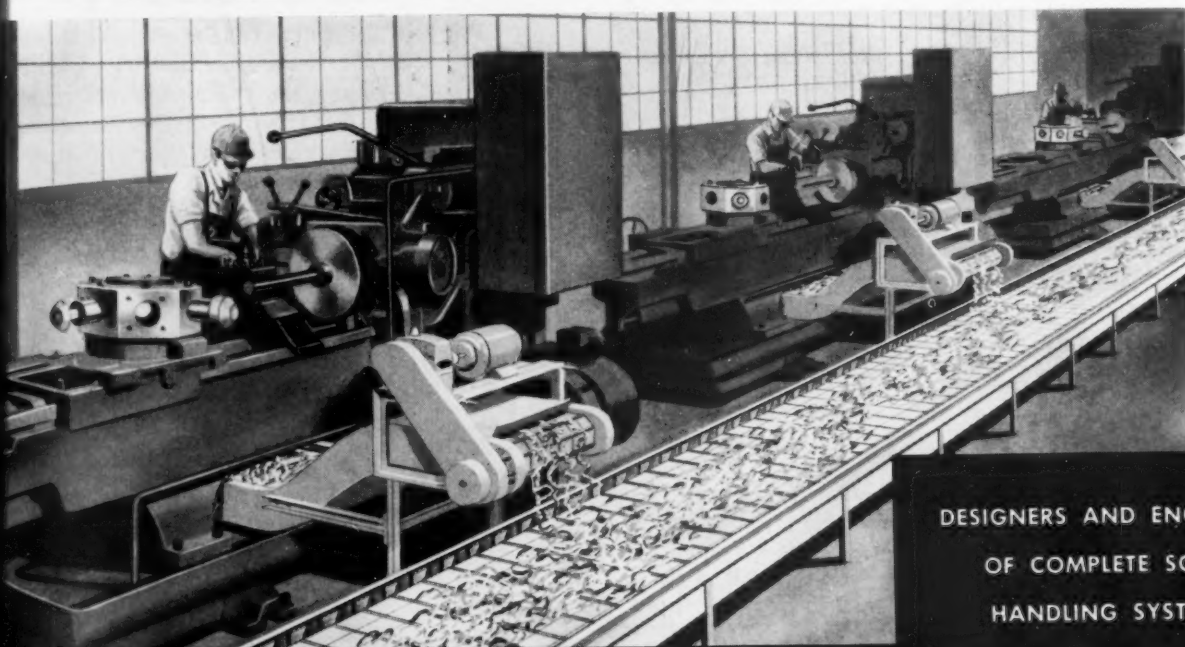
From oil to gas without steam interruption

A new steam generator can change from fuel-oil to natural gas fuel by flipping one switch and without interrupting steam output. The fuel-oil spray nozzle is incorporated into the metal body of the gas burner. When the fuel selection switch is flipped from natural gas to oil, the motorized gas valve closes and the fuel-oil solenoid valve opens, releasing oil under pressure to the spray nozzle. Fuel oil is always ready to be released to the combustion cham-

ber because it is continuously circulated through the steam generator's hydraulic modulating controls. A constant spark and pilot light insure positive lighting. Full working steam pressure up to 300 lb pressure is said to be developed in less than 3 min from cold water, and makes 1500 to 5000 lb of steam per hr. Generator is over 80 pct efficient. *Vapor Heating Corp.*

For more data circle No. 23 on postcard, p. 103.

Turn Page



SPEEDS PRODUCTION

Mass produced parts (heavy or abrasive) can be handled through heat treating, machining, inspection and other operations with MAY-FRAN conveyors. Press scrap systems can be made completely automatic. MAY-FRAN engineered handling systems assure outstanding speed and jam-free efficiency with maximum service life. Write today for complete details.



DESIGNERS AND ENGINEERS
OF COMPLETE SCRAP
HANDLING SYSTEMS

MAY-FRAN

ENGINEERING, INC.

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Cleveland 12, Ohio

LIFTING ZONE

with
Herc-Alloy
above...

it's
safer
below

DANGER ZONE

SPECIFY
HERC-ALLOY
SLING CHAINS



Write
for Data
Book

HERC-ALLOY

Sling Chains are registered by individual serial number and can be rebuilt or replaced at any time to original specifications.

The Allegheny Ludlum Steel Corp., pictured above, uses Herc-Alloy Sling Chains for hundreds of tough lifting jobs in its plants. In addition to maximum safety, Allegheny Ludlum also enjoys the extra economy of longer-lasting Herc-Alloy. These sling chains offer still another advantage...a weight reduction unmatched by any other alloy chain without any sacrifice in tensile strength. This reduces worker fatigue. All things considered, don't you think Herc-Alloy Sling Chains are worth a try in your plant.

MADE BY
COLUMBUS McKINNON CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corp.)

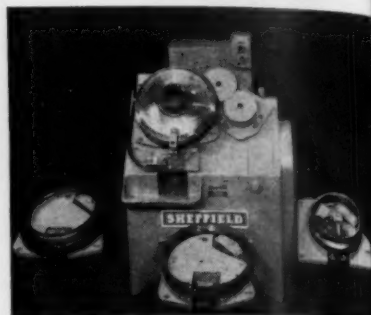
General Offices and Factories: **TONAWANDA, N. Y.** • District Offices: **New York, Chicago, Cleveland**
Other Factories at **Angola, N. Y.; Dixon, Illinois; Johannesburg, South Africa**
In Canada: **McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO**

New Equipment

Continued

Internal burring

A new internal burring machine chamfers the involute contour of internal spline and gear teeth, either straight or helical around their full form. Production rate depends upon the diameter and

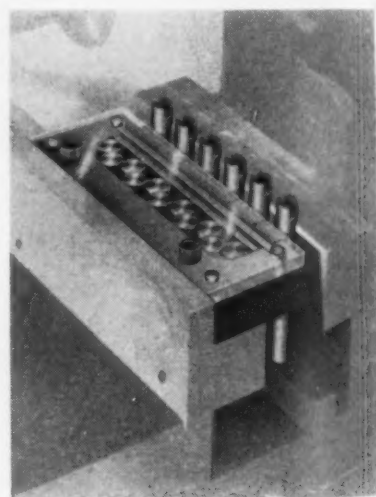


pitch of the gear teeth but is rated at 300 teeth per min. It is a universal machine tool and can be changed over from one type of gear to another in less than 30 min. *Sheffield Corp.*

For more data circle No. 24 on postcard, p. 101.

Multiple clamping

Ten parts can be clamped at once in a new device that automatically compensates for size differences. Called Compensating Equalizers, the devices provide a definite me-



chanical lock for parts that are hard or soft, regular or irregular in contour. They can be applied to all types of vises for milling, grinding, and can be used as component parts of jigs and fixtures. *Design Aids Co.*

For more data circle No. 25 on postcard, p. 102.

Bantam bench press

New air-oil combination hydraulic bench press is capable of delivering 5 tons of pressure when connected to a 100 psi air line. Principal advantages of the Pnu-draulic are its compactness, flexibility and economy of operation. Weighing only 300 lb, the press can be moved easily from place to place by two men; can be attached to any convenient air line and put to use; it has no motor and uses no electric



power, pumps or cooling water. Powerful ram thrust makes it especially suited for staking, riveting, forming, piercing, crimping, sealing, broaching, trimming, flanging. Press has soft-toned operation; operates on dual pressure system. *Alliance Mfg. Co.*

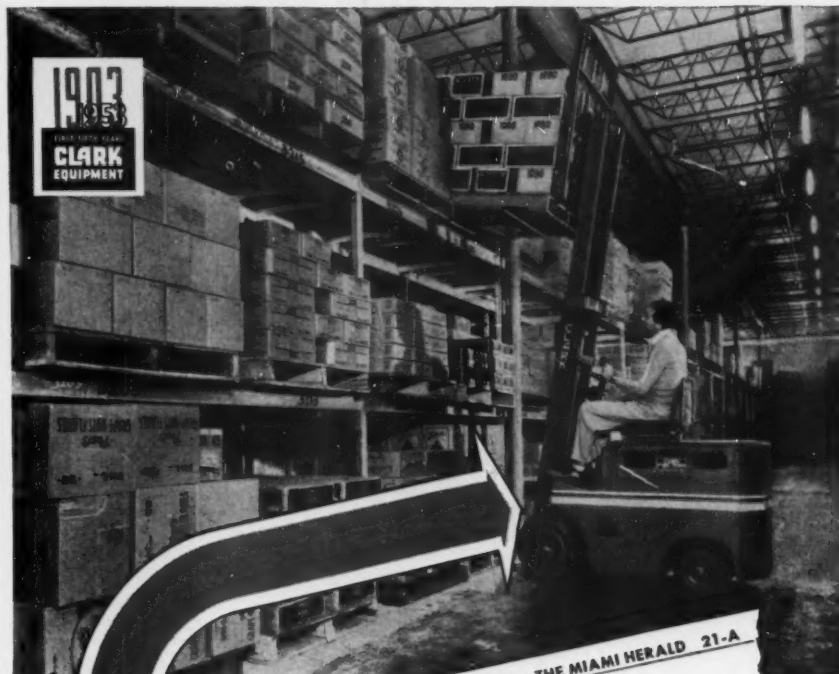
For more data circle No. 26 on postcard, p. 103.

Phenolic resins

New phenolic resins based on R-108 chemistry are said to impart outstanding chemical resistance to protective coatings. Not finished coatings in the generally accepted sense, the resins are converted into a wide variety of finishes by coating formulators. Film-forming in themselves, they are capable of producing coatings that are highly resistant to corrosive and oxidizing agents. Free from the conventional phenolic coating's tendency to crater, the finishes based on these new Methylon resins can be applied more easily and quickly. *General Electric Co.*

For more data circle No. 27 on postcard, p. 103.

Turn Page



How To Make More Money

Tuesday, October 21, 1952 THE MIAMI HERALD 21-A
Financial News
Winn & Lovett's Earnings On Rise
By United Press
JACKSONVILLE—Winn & Lovett Grocery Co. reported for the quarter ended Sept. 20 sharply higher earnings, reflecting economies achieved through mechanization in warehousing and merchandise handling.
Net for the first quarter of the current fiscal year totaled \$600,597, or 44 cents a share on common, compared with \$409,342 or 29 cents in the same quarter last year. Net sales of \$41,851,672 compared with \$36,763,499.
As of Sept. 20 the food chain had in operation 181 retail outlets in the state of Florida.

THIS NEWS CLIPPING suggests one way to make more money. Winn & Lovett's "sharply higher earnings" prove that a dollar saved is still a dollar earned.

"Mechanization" saved more than 50% of Winn & Lovett's handling bill. "Mechanization" in this case means a fleet of CLARK fork trucks and towing tractors, operated on a well-planned schedule. These savings, together with increased retail volume and retail operating improvements, resulted in "sharply higher earnings," and the company made financial headlines.

The moral of this story is this:

Call in your local CLARK dealer to discuss ways to cut handling costs. That's what Winn & Lovett did, and look what happened!

CLARK ELECTRIC, GAS, DIESEL, L.P. GAS
FORK TRUCKS
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 51, MICHIGAN

Please send: ☐ Condensed Catalog ☐ Have representative call
☐ Driver Training Movie

Name _____

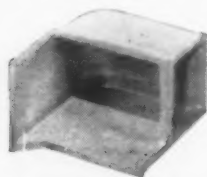
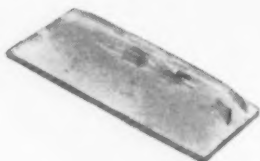
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Street _____

City _____ Zone _____ State _____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

"Strike if you must, I was never in better condition."



We've never been in better condition to handle your requirements for lightweight castings, magnesium or aluminum.

Our four completely equipped plants and staff of competent personnel enable us to offer you the finest production facilities.

Purchasing, engineering, production and management men in industries everywhere have found the name WELLMAN synonymous with sound castings made under close metallurgical control . . . complete facilities for a wide range of products . . . a sincere interest in their problems.

We'll be glad to send a representative to call, and in the meantime, our new catalog No. 53 will tell you more about us and our almost half century of experience.

Well-Cast

MAGNESIUM AND ALUMINUM CASTINGS

Well-Made

WOOD AND METAL PATTERNS



THE WELLMAN BRONZE & ALUMINUM CO.

Dept. 8, 12800 Shaker Boulevard

Cleveland 20, Ohio

New Equipment

Continued

Stores in 5-ft aisles

Aisle with requirements for tote box storage have been reduced from 14 to 5 ft through the use of a fork lift truck designed to handle skids and single faced pallets. It has an elevated height of 127 in. and can actually right angle stack these tote box loads from aisles only 60 in. wide. Other models will transport and stack double face pallets.



pallet boxes and other types of unit loads. A single offset drive and steering wheel, compensated by a free swiveling caster on the other side of the truck, are responsible for this great maneuverability. The power trucks are the stand-up rider type, battery powered, and are capable of handling 1 to 2-ton loads in narrow aisles and congested areas. *Raymond Corp.*

For more data circle No. 28 on postcard, p. 163.

Phosphate coatings

In one single step, Chem-Bond, an acid phosphate cleaner, will remove rust, corrosion, grease, and mill-oil. It also retards corrosion and oxidation and establishes a new type phosphate coating to which paint, enamel, lacquer and plating will securely adhere. Chem-Bond is applicable as an immersion dip, a brush on-wipe off operation or as a spray. *Bell-Ray Chemical Corp.*

For more data circle No. 29 on postcard, p. 163.

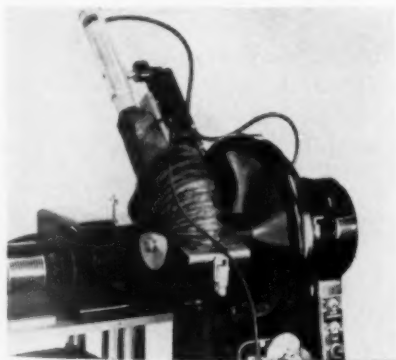
Packaged installations

A new service has been created by which industrial customers can purchase packaged installations of complete Lake Erie Engineering production equipment, set up in their plant, ready to operate. As part of the service the company will survey the customer's hydraulic press or die casting requirements and make specific recommendations. They will design, manufacture, supply and install all the basic machinery, tools, dies, conveyors, loading mechanisms, furnaces and other related auxiliaries. In short, the packaged-installation plan provides engineered production facilities that make the most efficient use of time, space, machinery and labor. *Lake Erie Engineering Corp.*

For more data circle No. 30 on postcard, p. 103.

Helium attachment

New attachment for Norelco X-ray Spectrograph units permits use of helium instead of air in the path of the X-ray beam. The helium atmosphere extends the useful spectrum range of the X-ray analyses equipment. With an air path and a rock salt analyzing crystal, consistently good qualitative and quantitative results reportedly have been possi-



ble in the spectrum from calcium to uranium. With helium, work extends down to sulfur, and results indicate a probable sensitivity limit 0.02 pct for sulfur, with comparable sensitivity limits for other elements in the same atomic range. *North American Philips Co.*

For more data circle No. 31 on postcard, p. 103.

Turn Page

what would
these additions
to your plant and equipment

Cost you?

what would WEBER
subcontract facilities

Save you?



The **COST** of WEBER Subcontract facilities is small compared to the money you'd invest in your own buildings and facilities.

The **SAVINGS** might well be large, for Weber consistently increases output and quality of units with ingenious production techniques . . . has increased production up to 200% for various clients.

A WEBER production engineer will review your requirements, prove advantages of our service and get your job rolling, fast! Use coupon for complete details.

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SHAPING
TAPPING
TURNING
WELDING
RIVETING

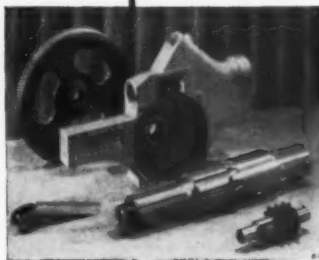
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Send () production engineer

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Firm _____

Address _____

City _____ Zone _____ State _____

PURCHASE ORDER

LESCO CORPORATION
Pittsburgh 3, Pa.

SHIP VIA truck F. O. B. delivered DELIVERY PROMISED 10/6/53

PLEASE ENTER OUR ORDER FOR THE FOLLOWING MATERIAL SUBJECT TO THE TERMS AND CONDITIONS PRINTED HEREON

15 Bars 3/4" x 2" Hot Rolled Mild Steel-- 17/20' stk lengths
 6 1/2" Hot Rolled Rounds, 20/22' stock lengths
 38 Pieces 27-1/2" x 10' x 26 gauge Galvanized Sheets
 5 Aluminum Sheets 48" x 8' x .032
 3 Steel Windows No. 33 per photo
 3 Sheets green Alsynite Co.
 6 Grating, Type 1R4,
 1 STEFCO Metal Bull
 per specific.

DELIVERED
by *Lesco Corp*
✓ As Specified
✓ On Time

Stamp of Approval

No need to waste your valuable time ordering from many suppliers when Lesco can handle your entire order as specified and on time.

We have on hand at all times for immediate delivery to you a complete line of steel, angles, channels, beams, plates, sheets, bars, open steel flooring, Alsynite daylighting panels, galvanized and aluminum roofing, aluminum sheet, rod and tubing, steel doors and frames, and many other products for building and industry.

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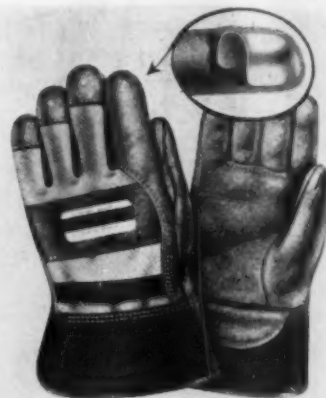
116

New Equipment

Continued

Safety gloves

Steel box principle is used in the Free Touch Armortip safety glove to provide protection for fingers. A tempered carbon steel cap is cemented into the tips of three fingers on each hand. The glove is lightweight and so designed that safety tips do not interfere with complete

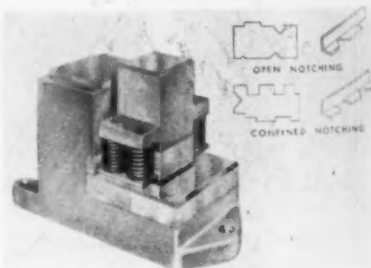


hand freedom of the workman. Each tip resists a pressure of two tons, giving a combined resistance of 6 ton for each hand. Gloves are made of green sueded pigskin and marked with large label across back. First three fingers are punched on back so that the steel tips are visible. *Wolverine Shoe & Tanning Corp.*

For more data circle No. 32 on postcard, p. 103.

Notching units

Design of a new line of notching units permits them to be set up quickly on T-slotted plates or templates mounted in or out of the press. Units are self-contained, permanently aligned punches and



dies that eliminate all attachments to the upper ram of the press. Lifter springs, punch and die are contained in a single holder. Shut height is 6 5/16 in. and die height, 2 19/32 in. *Toolset Div. of General Riveters, Inc.*

For more data circle No. 33 on postcard, p. 104.

THE IRON AGE

Electrode holders

Two new coolie welding electrode holders feature special construction, with inside mechanism suspended in the handle for better ventilation. This insures cool operation. Holders are lightweight, ruggedly constructed, offered in



straight-nose or the offset pug-nose holder types. Both take up to 1/4-in. rod. Metal parts of the holders are made from high copper content aluminum bronze for toughness and high conductivity. Handle is right size for fatigue-free grip. Cam-Lok Div. Empire Products, Inc.

For more data circle No. 34 on postcard, p. 103.
Turn Page

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE
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AND MOST MODERN
PRODUCTION
FOUNDRIES

ESTABLISHED 1866
**THE WHELAND
COMPANY**
CHATTANOOGA 2, TENN.

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More power per pound! That's the reason the NEW Buckeye Air Turbine Grinder will cut through grinding jobs faster, with less effort for the tool operator. Versatile—designed for use with tungsten carbide burs, adaptable to use with rotary files and midget mills, may be mounted on tool post, takes mounted points up to 1/4" shank.

Write NOW for complete information on this NEW addition to the Buckeye Tools line of 56 portable air-powered grinders.



bearings sealed in grease—
NEVER REQUIRE LUBRICATION
use with tool post holder—
MORE ACCURATE GRINDING
efficient turbine bucket
design—ALWAYS RUNS COOL
operates without vibration—
EASY TO HANDLE
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the world's first
successful
rotary air tools

MECHANICAL TUBING FROM STOCK

Murray warehouse stocks of cold-drawn and hot-finished mechanical tubing—in carbon and stainless steels—contain a complete range of sizes and wall thicknesses for prompt delivery. Hundreds of tube users repeatedly rely on Murray for dependable tubing service—in quantities to meet their production schedules.

When in need of mechanical tubing— $\frac{1}{8}$ - to 12-inch O.D. from stock—call a Murray warehouse first and be sure of quick and dependable tubing service.

WRITE FOR CURRENT STOCK BULLETIN



Other Murray products include boiler and pressure tubes, stainless steel pipe and fittings, IPS pressure tubing, seamless and welded pipe, JIC hydraulic tubing, carbon steel welding fittings and all types of tube fabricating to order.



New Equipment

Continued

Folding rack

Folding rack is a portable self-stacking rack for miscellaneous materials. Ends fold inside the rack frame when empty, or when being shipped. The end when swung up locks in a vertical position for safe



fast handling and storage. Various sizes are capable of carrying loads 3000 to 5000 lb. Racks can be stacked 6 tiers high, loaded to their full limit. *American Metal Products Co.*

For more data circle No. 35 on postcard, p. 101.

Disposable paper cap

New work caps, made of heavy Kraft paper which has been treated with neoprene synthetic rubber were developed by du Pont's safety engineers for use in chemical plants. The cap is water repellent; comes pre-treated with a flame



retardant; does not collect dust; is lightweight, substantial and holds its shape well. It is less expensive than cloth caps and while it does not have the physical strength of a cloth cap, it does not soil any faster. Neo-Caps are available in a full range of sizes from *Record Industrial Co.*

For more data circle No. 36 on postcard, p. 101.



GET RAPID-FIRE PRODUCTION

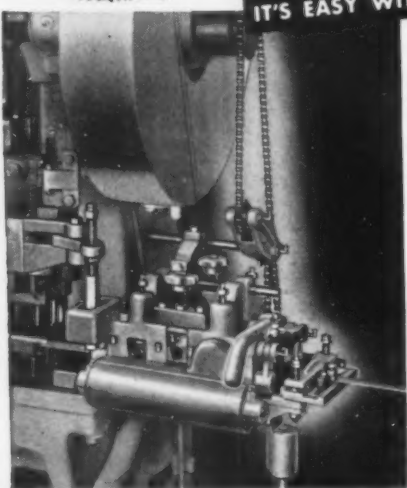
from your PUNCH PRESSES

IT'S EASY WITH

WITTEK

Automatic Roll Feeds

Wittek automatic roll feeds fit all makes and sizes of punch presses—provide maximum efficiency and extreme accuracy in the high speed automatic feeding of strip stock. Made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any direction. Length of feed is easily adjusted to meet individual requirements.



WITTEK Reel Stands

Simplify Handling of Coiled Stock

Choice of standard models to facilitate handling coiled stock . . . from small, light coils to those weighing up to 800 pounds. Larger reel stands automatically center the coils—provide frictional braking action to prevent overrunning, maintain uniform coil slack.

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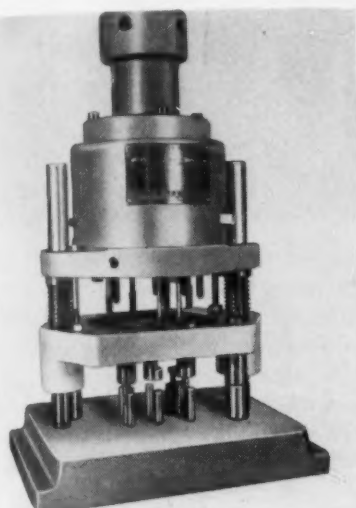
WITTEK Manufacturing Co.

4329 W. 24th Place, Chicago 23, Illinois



Self-clamping jig

A complete line of self-clamping drill jigs can be used with Zagar gearless multiple spindle drill heads to perform drilling, reaming and tapping on standard drill presses and tapping machines. Four distinct types accommodate various sizes of workpieces, handling hole patterns from 3 to 15 in. diam. The jigs are fast in operation, but work



to very accurate tolerances. When used on drill presses equipped with power feeds and automatic cycling they achieve maximum production, because the operator handles parts only. Zagar Tool Inc.

For more data circle No. 37 on postcard, p. 103.

Wet burnishing

New wet burnishing process designed to improve conventional polishing and buffing procedures uses revolving rubber mats which operate in a wet slurry. Parts to be burnished are advanced through the slurry on a carrier moving in a circular or other enclosure. The rubber fingered mats used on the Ger-O-Matic machines provide important savings in buff costs. Compounds in the abrasive slurry are reused over and over with little loss. Absence of dust reduces fire and health hazards and makes exhaust systems unnecessary. Gerity-Michigan Corp.

For more data circle No. 38 on postcard, p. 103.

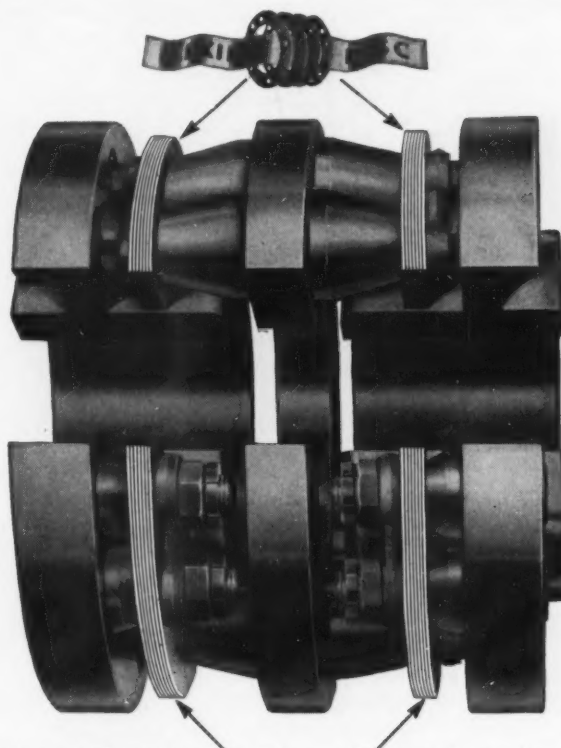
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AVOID COSTLY SHUT-DOWNS!

Specify THOMAS Flexible Couplings for Power Transmission

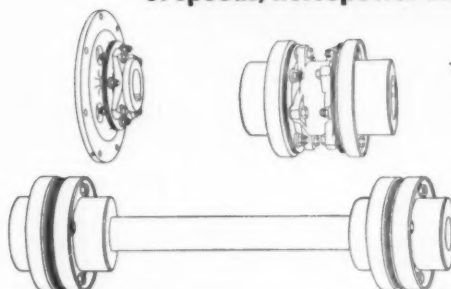
DISTINCTIVE ADVANTAGES of THOMAS ALL-METAL COUPLINGS

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.



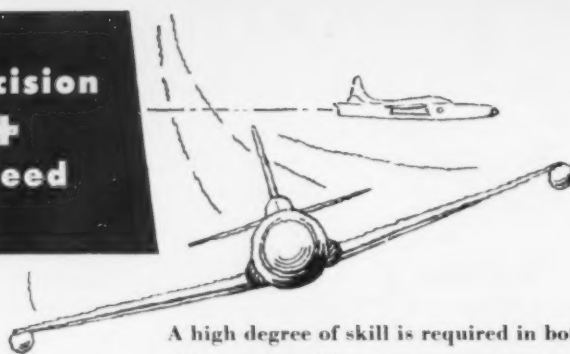
THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

MANUFACTURERS OF FLEXIBLE COUPLINGS ONLY FOR OVER 35 YEARS

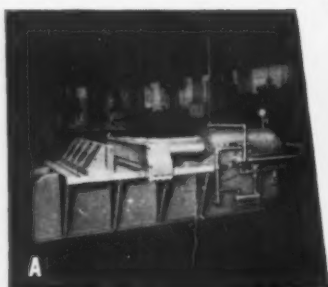
Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

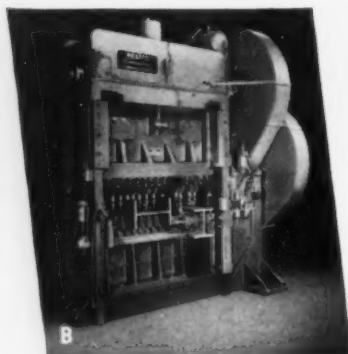
**precision
+
speed**



A high degree of skill is required in both flying and building modern military aircraft. BEATTY machines, like the latest of the supersonic jet jobs, are precision-built to afford maximum accuracy and speed in metal fabricating operations. Let a BEATTY engineer analyse your industrial machine needs—if one of the machines shown doesn't answer your production problem, we'll design and build one to your exact requirements.



A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

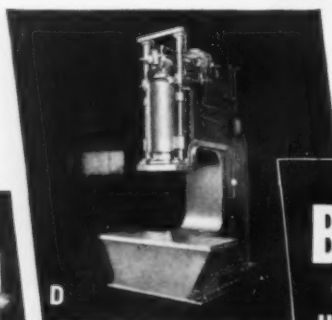
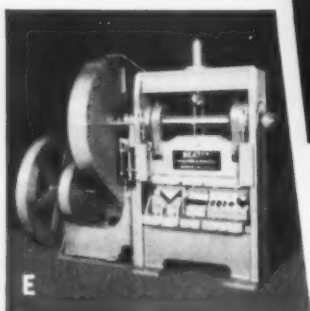


B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.



BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA

New Equipment

Continued

Carbide wheels

Faster and cooler cutting is claimed for a new series of silicon carbide wheels for grinding tungsten carbide tools, and field tests show substantially longer life in use than wheels previously available. New



ingredients in the vitrified bond combined with a distribution of the abrasive particles enable the wheels to penetrate and cut tungsten carbide with maximum efficiency. The new wheels are tradenamed SiClone. Fuller Merriam Co.

For more data circle No. 39 on postcard, p. 101.

Black plating process

For decorative and protective finishes, Electro-black provides for fast, economical deposition of a black plate on practically all metals except aluminum. On die cast metals, a thin copper or brass undercoat will suffice for Electro-black treatment. It will reflect the surface underneath without additional polishing or processing and is easily high-lighted. Three to 4 min plating, at 1 v, with 10 amps per 100 gal of solution is required. Enequist Chemical Co., Inc.

For more data circle No. 40 on postcard, p. 101.

Battery protection

Corro-Vent is a new non-corrosive chemical application that prevents corrosion of automobile batteries and other type storage batteries. Paint Corro-Vent on battery terminals, frame and connecting rods with brush on screw top of 8-oz can and the battery is said to be corrosion proof for its lifetime. Each can contains enough applications for 40 batteries. Balari Laboratory.

For more data circle No. 41 on postcard, p. 101.

The Iron Age

SALUTES

Walter S. Praeg

Combined talents for engineering, business enabled him to build a strong firm from small beginnings.



EQUAL parts of top-notch engineer and good businessman are combined in Walter S. Praeg. The result has earned him industry-wide recognition as a leader in his chosen profession.

As president of National Broach and Machine Co., he heads an organization he helped build from a meager beginning into one of the most important firms in the gear finishing and broaching industry.

Apprenticed to Charles F. ("Boss") Kettering at the old Delco Engineering Laboratories in Dayton, Walter's major interest from the start was in machine tools and tooling. Advanced ideas on gear shaving and broaching led him to Detroit where he felt the auto industry would be a good market for his abilities. His list of patents is proof of these skills. These days his technical work is largely confined to broaching-tool and gear-finishing developments.

Walter is also a firm believer in industrial teamwork. His success in applying this principle was summed up during the war by Ordnance Col. A. B. Quinton who remarked of National Broach, "This company represents an outstanding example of intelligent, humanitarian management and skilled, cooperative employees. The two have combined their efforts to make this organization a compact, efficient unit."

Despite increasing demands on his time, he is active in a number of Detroit technical societies including the American Society for Tool Engineers, Society of Automotive Engineers and American Society of Naval Engineers. In what little time is left Walter Praeg is also an enthusiastic golfer and fisherman.



IMPACT TESTS · METALLOGRAPHIC TESTS
MAGNA-FLUX TESTS · RADIOGRAPHIC TESTS
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ULTRASONIC TESTS
TO MEET YOUR REQUIREMENTS

Standard Steel's Modern Laboratory Control With Thorough Testing is one of
SIX REASONS why you should always call Standard Steel for rings and flanges:

- 1 TESTING**—radiographic tests, tensile tests, hardness tests, ultrasonic probing of internal structure, etc.
- 2 QUALITY STEEL**—maintained constantly through production of own steel by acid process.
- 3 UNIFORMITY**—assured by precise control of forging and rolling operations.
- 4 CAPACITY**—unsurpassed ability to produce weldless rings all the way up to 144" O.D.
- 5 EXPERIENCE**—produced by skilled workmen with 20 to 40 years experience.
- 6 FAST SERVICE**—a vital factor in the continuing growth of Standard Steel for over 150 years.

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The Iron Age

INTRODUCES

Robert K. Beck, elected president, APEX SMELTING CO., Chicago.

William O. Faxon, elected a vice-president in charge of manufacturing, METAL DISINTEGRATING CO., INC., Elizabeth, N. J.; and **Harold E. Collins**, also elected a vice-president.

Edgar D. Leon, elected president and a director, THE GEAR GRINDING MACHINE CO.

Harold W. Sweatt, elected chairman of the board, MINNEAPOLIS-HONEYWELL REGULATOR CO.; succeeding **Mark C. Honeywell**, who was named honorary chairman; and **Paul B. Wishart**, elected president.

R. B. Crean, appointed a vice-president, Ingersoll Products Div., BORG-WARNER CORP., Chicago.

Willard H. Spence, appointed assistant to vice-president-Sales, BROWN & SHARPE MFG. CO., Providence; and **Earl P. Leeds**, named general sales director, domestic machine tool sales.

W. L. Fabianic, becomes executive assistant to the vice-president and director of research, LACLEDE-CHRISTY CO., St. Louis.

Arthur C. Stern, becomes a member of the air and stream pollution engineering group, KAISER ENGINEERS DIV., of Henry J. Kaiser Co.

Richard G. Edwards, appointed director of merchandising, THE STANLEY WORKS, New Britain, Conn.; and **Gerald M. Fletcher**, promoted to director of advertising.

W. J. Stoddard, named district supervisor, Michigan, Metal Processing Dept., PENNSYLVANIA SALT MANUFACTURING CO., Philadelphia.

Raymond H. Kelm, joins staff, VANADIUM-ALLOYS STEEL CO., Latrobe, Pa.

Howard P. Taylor, appointed director of public relations, ROSAN, INC., Newport Beach, Calif.

Charles R. Youmans, appointed to the staff of THE CYRIL BATH CO., Solon, Ohio.

C. Burton Clark, named senior mineralogist, HARBISON-WALKER REFRACTORIES CO., Pittsburgh.

Jess C. Laughlin, promoted to works industrial engineers, Fairfield plant, TENNESSEE COAL & IRON DIV. of U. S. Steel; and **L. Gordon Rickles**, promoted to assistant works engineer.

Dr. Erich Modl and **Dr. E. Modl**, become senior research assistants, Metals Research Laboratories, ELECTRO METALLURGICAL CO., Niagara Falls, N. Y.

Oscar F. Stewart, promoted to comptroller, COMMERCIAL CONTRACTING CORP., Detroit.

Dr. Samuel J. Nelson and **John E. Wier**, added to the resins and plastics group, Research & Development Dept., HOOKER ELECTROCHEMICAL CO.

Raymond Sellon, Jr., becomes head of Product Research Development Div., STOLPER STEEL PRODUCTS CORP., Menomonee Falls, Wis.

Bernard Brezinski, appointed service engineer, CORY CORP., Chicago.

M. F. Judkins, new products manager, will be in charge of commercial sales of zirconium and zirconium alloys, FIRTH STERLING, INC., Pittsburgh.



J. P. GILL, elected president, Vanadium-Alloys Steel Co., Latrobe, Pa.



WALTER C. THOMPSON, elected president, The Torrington Co., Torrington, Conn.



LANCE H. COOPER, elected a vice-president, The International Nickel Co. of Canada, Ltd.

Personnel

David Reid, appointed manager, Abrasive and Bond Plants, NORTON CO., Worcester, Mass. He replaces Albert E. Hall, who has retired. Robert G. Clarke, becomes superintendent, Abrasive and Bond Plants.

John Drollinger, Jr., becomes manager, Renewal Parts & Repair Div., Cleveland, RELIANCE ELECTRIC & ENGINEERING CO., Cleveland; William C. Mitchell, becomes manager Toledo sales office branch; and Robert O. Gee, named manager of service.

E. H. Frank, appointed plant superintendent, WASHINGTON STEEL CORP., Washington, Pa.

Roy W. Scholl, named general manager, SOUTHWEST STEEL ROLLING MILLS, Los Angeles, Calif.

Kenneth L. Vore, named general traffic manager, WESTINGHOUSE ELECTRIC CORP., Pittsburgh.

Joseph H. Homan, appointed district manager, Cincinnati office, SIPI METALS CORP.

Thomas M. Geraghty, named district sales manager, DEWALT, INC., Lancaster, Pa.

Edward A. Murphy, named sales manager, LEHIGH STRUCTURAL STEEL CO., Allentown, Pa.; and Carlton K. Reinsmith, made assistant to the sales manager.

W. C. O'Connell, appointed general manager, Aircraft Accessory Turbine Dept., GENERAL ELECTRIC CO., Schenectady.

Henry P. Hejmanowski, appointed Chicago regional manager, THE LAMSON CORP., Syracuse, N. Y.

Harvey F. Smith, named sales manager, Pittsburgh Warehouse, FOLLANSBEE STEEL CORP., Pittsburgh.

Robert W. Dorn, joins sales staff, Pittsburgh, L. B. FOSTER CO., Pittsburgh.

John Schlarb, named works manager, PENNSYLVANIA PEERLESS CORP., Pottsville, Pa.; and Vern Wilson, named general foreman.



RICHARD HEROLD, appointed vice-president—Foundry Sales, Taylor-Wharton Iron & Steel Co.



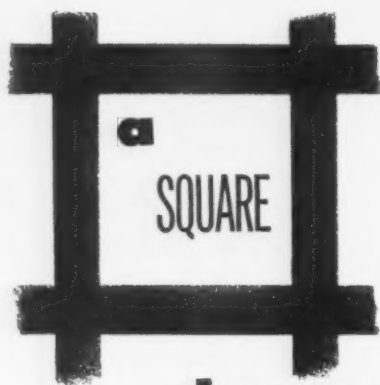
RAY B. NICHOLS, elected executive vice-president, The Torrington Co.



MATTHEW J. BETLEY, appointed vice-president and general manager, Aeroquip Corp., Jackson, Mich.



LOUIS W. HESSE, appointed director of industrial relations, Keystone Steel & Wire Co., Peoria.



beyond compare!

This close-up of Hendrick Perforated Metal Plate shows no ordinary screen. No other screening medium can equal it for uniformity of mesh, for non-binding clearance and for unparalleled long service life

Flat or corrugated Hendrick Perforated Metal is available in any desired shape and size of perforations in high carbon steel and other commercially rolled metals. Decks can be changed fast and efficiently—cutting time and labor costs. For more details write for information.



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If college degrees were awarded to industrial plants as well as to students, the big Wetherill machinery plant at Sun Ship would certainly be a candidate for an "M.M."—Master of Metals.

Cylinder assembly, shown above, for a massive 2750-ton extrusion press is a sample of the plant's qualification for the title. But—fine example of power and precision that it is—it is just one example of many that can be seen year in and year out in the massive machinery-building plant that has been doing special work for a great variety of industries through the years.

Giant engine lathes with 132-inch swing up to 50 feet in length, small turret lathes, planers up to 14 feet wide, and a special crankshaft machine for shafts of largest sizes are among the modern machine tools which give Sun Ship's plant its versatility and speed in construction. Coupled with the skill and experience of the staff, the facilities of Sun Ship have set a notable record of service to many varied industries in building special machinery... and thus helping build a greater America.

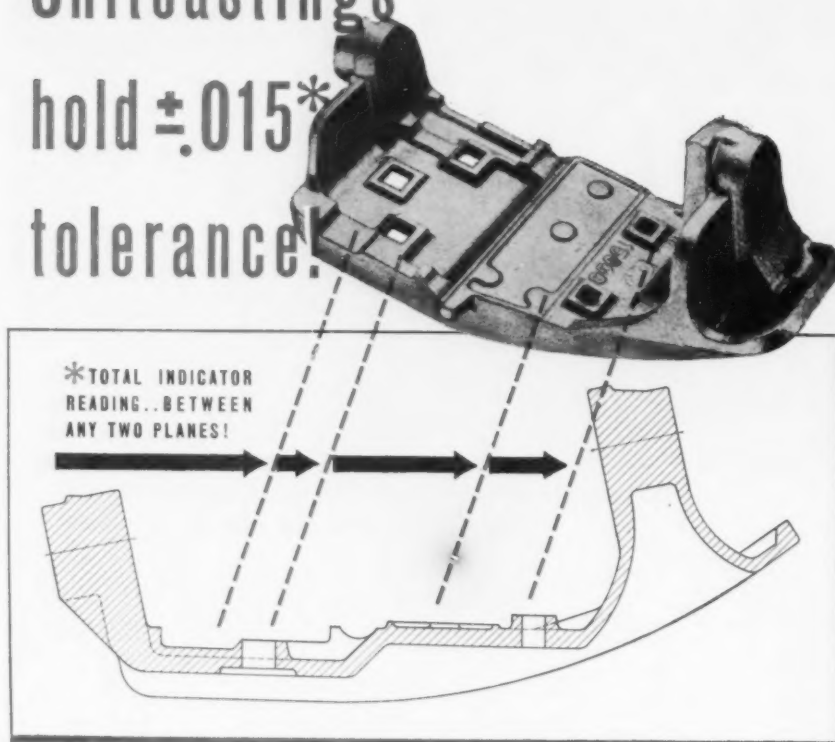
Sun

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Unitcastings
hold $\pm .015^*$
tolerance!



..substantially reduces finished cost!

Functioning as an important part of a mowing machine cutter mechanism, this Inner Shoe is responsible for holding all correlated parts in alignment. Accuracy must be maintained throughout the roughest service . . . and *initial accuracy* is a "must" in reducing assembly cost!

Unitcast "foundry engineering" successfully solved the basic problems. By holding a tolerance unusual in cast steel, the necessity of machining fit surfaces was eliminated and the result . . . *less finished cost!* Practical design and experienced foundry procedure met all other requirements for durability. To date, the accumulated production figure is well over 200,000 units . . . *with less than .002% rejection!* Another example of Unitcast's ability to produce quality steel castings!

Why overlook the cost-cutting possibility in your product? A slight revision in design or specification might be beneficial. Call in Unitcast today. No obligation, of course!

UNITCAST CORPORATION - Toledo 9, Ohio

In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

Unitcast



QUALITY
STEEL
CASTINGS

Personnel

Continued

Nicolas J. Balazs, and Willard H. Melton, named superintendents, Service Section, General Machinery Division, ALLIS - CHALMERS MFG. CO., Milwaukee; and Dudley B. Smith, Jr., appointed service engineer, Midwest region.

Howard A. Simons, named sales representative, Cleveland headquarters, AMERICAN BUFF CO., Chicago; and Armand C. Maran, named sales representative, Niles, Ohio headquarters.

Arthur C. Engh, becomes special representative, UNIVERSAL SHEET & STRIP STEEL CO., Chicago.

Edmund T. Grady, appointed district sales representative, REPUBLIC STEEL KITCHENS in New England and Upper New York State.

Ray H. Scheurer, appointed sales representative, MIDVALE CO., Cleveland territory.

Gilbert P. Muir, appointed western Pennsylvania sales representative, ALLOY PRECISION CASTINGS CO.

Sidney Norwood and E. H. Krauss, appointed sales representative, Michigan area, MARSAM CORP.; C. A. Wright, named sales representative, Northern Pennsylvania and Western New York; Murray A. Magloff, becomes sales representative, New York and New England; W. R. Murphy, named sales representative, Eastern Pennsylvania and Southern New Jersey areas; and Walker Davis, sales representative, Indiana and Kentucky.

OBITUARIES

Francis J. Lapointe, 68, founder of American Broach & Machine Co., Ann Arbor, Mich., in St. Joseph's Mercy Hospital. He was chairman of the board of directors and executive vice-president of Acme Broach Corp. of Milan.

A. Donnally Armitage, 81, chairman of J. H. Williams & Co., Buffalo.

Charles J. Koch, manager of engineering, Medium Induction Motor Dept., General Electric Co., Schenectady, recently, after a prolonged illness.

At high speed—

The Iron Age
FOUNDED 1855
Technical Articles

New Mill Induction Welds Aluminum Tubing



By T. M. Rohan
West Coast Editor

◆ **HIGH-SPEED INDUCTION** welding of aluminum irrigation pipe from coiled strip may well herald a new era in production of nonferrous pipe. The induction welded pipe is being produced on a new Yoder cold forming mill, with 50 kw Allis-Chalmers electronic induction heater, installed at the Trentwood, Wash., rolling mill of Kaiser Aluminum and Chemical Corp.

Initial production will be on 4-in. OD pipe with an 0.047-in. wall. Speeds up to 120 fpm, depending on pipe diameter, are possible on the mill. A substantial reduction in costs as compared with pipe produced by conventional extrusion methods used at other Kaiser plants is claimed. Complete data appears in Tables I, II, III.

Although extent of the cut in production costs has not been fully worked out at current speeds of 62 fpm, tentative prices by Kaiser Aluminum are 4 to 4.5 pct under equivalent extruded piping.

Basic operation of the machine for 4 in. pipe is as follows:

Coils of aluminum strip about 12½ in. wide are drawn into the machine from a standard reel. The strip passes through nine sets of cold forming rolls which can be changed for pipe of varying diameters. First three are simple rolls of increasing convexity. Last two are four-roll idler clusters which exert pressure from inside

◆ Aluminum irrigation tubing is being produced faster, and at lower cost, on a new high speed mill . . . A new Yoder mill, at 62 fpm, rapidly turns aluminum strip into 4-in. tubing.

◆ Cost of induction welded tubing produced on the new mill is below that of extruded tubing of similar quality . . . The tubing is strong and can be successfully bent without weld breaks.

◆ One big advantage is that tubing will be available in a wider range of alloys and in tempers from dead soft to full hard . . . Higher mechanical properties give equivalent strength with less stock . . . Wall thickness is more uniform and surface is finer.

and outside. Last set brings two edges together over a mandrel.

Formed pipe passes between coils of a 50 kw electronic induction heater operating at 450,000 cycles per second. Heat is confined to the immediate area and pipe can be touched immediately after leaving coil. No fillet is used. The X welded seam passes under two cutting heads to remove excess bead. Finished pipe is cut into 20-ft lengths (adjustable to 40-ft) by a flying saw.

Pipe is manually placed in a hydraulic pressure test set-up handling six pipes simultaneously and tested to 300 psi. Pipe is removed from the tester for a cleaning operation which

Availability of aluminum sheet in the same plant prompted the venture into welded tubing . . .

removes oils and test fluid, and the pipe is then ready for stockpiling.

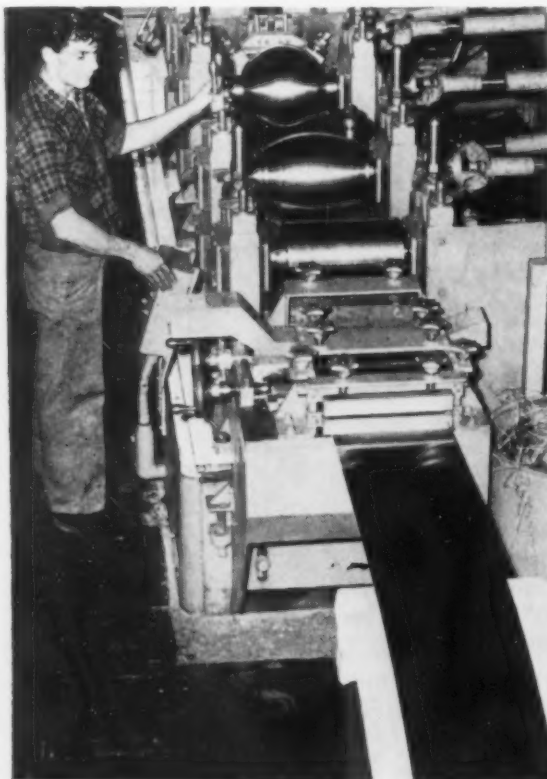
Aside from lower production costs, major incentive for Kaiser was immediate availability of aluminum sheet within the same plant. This prompted the venture into sheet welding rather than extruded pipe such as turned out at the Halethorpe, Md., mill. Located in the heart of a big irrigation pipe market the Trentwood plant will turn more of the plant output into local channels. The neighboring Spokane Aluminum Supply Co. has for 2 years turned out shielded arc welded pipe from Kaiser sheet with marked success. A handmade mill is used. It is effective but does not have the speed potential of the Yoder mill.

TABLE I

WELDED vs. EXTRUDED PIPE PRICES

	Induction Welded 4S Aluminum 0.047 in. Wall Tubing	Extruded Pipe 0.050 in. Wall
2 in.	18.70	17.40
3 in.	24.33	25.40
4 in.	30.33	31.75

All prices per 100 ft f.o.b. mill, carload freight allowed.



STRIP ENTERING Yoder mill. As the strip passes through successive rolls it is gradually formed into a round. Strip is 12.5564 in. wide.

Total Kaiser investment is tagged at about \$250,000 compared to probably twice that for an equivalent extrusion press. Foundation costs are also markedly less for the forming set-up.

From the finished product standpoint, major advantages of the induction welding mill are as follows:

1. Properties available will approach those of cold-rolled aluminum. A complete range of tempers is available from dead soft to full hard (O to H-18), in contrast to the limited temper range available in extruded aluminum.
2. A wider range of alloys can be used than is possible in extruded tubing.
3. Improved smoothness, uniformity of wall thickness and appearance are attained.
4. Higher mechanical properties give equivalent strength with less stock and permit lower weights for easier handling by users. Pressure testing to 300 psi is 150 pct above specifications.

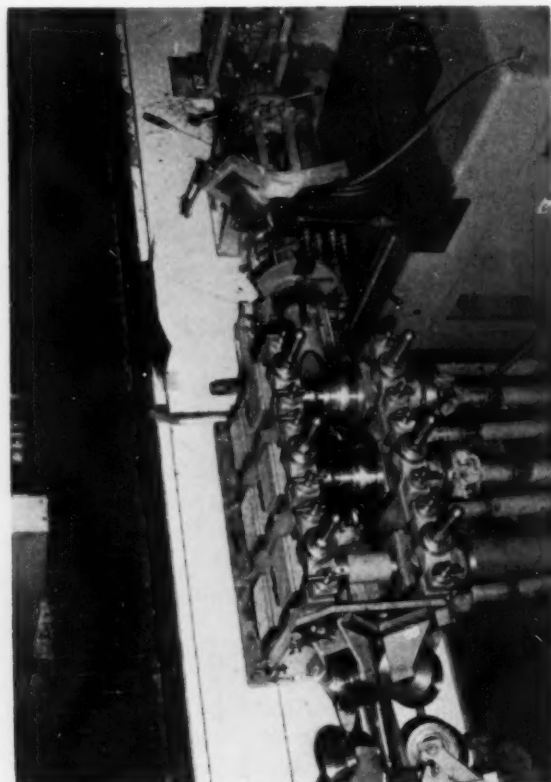
Although not envisioned for any metals be-

TABLE II

MILL PRODUCTION CAPACITIES

Gage in in.	Tube Production, fpm		
	2 in. OD	3 in. OD	4 in. OD
0.040	120	90	*
0.051	120	80	65
0.090	80	60	50

* Production rate for 4 in. tubing from 0.040 in. gage metal, or lighter, is uncertain.



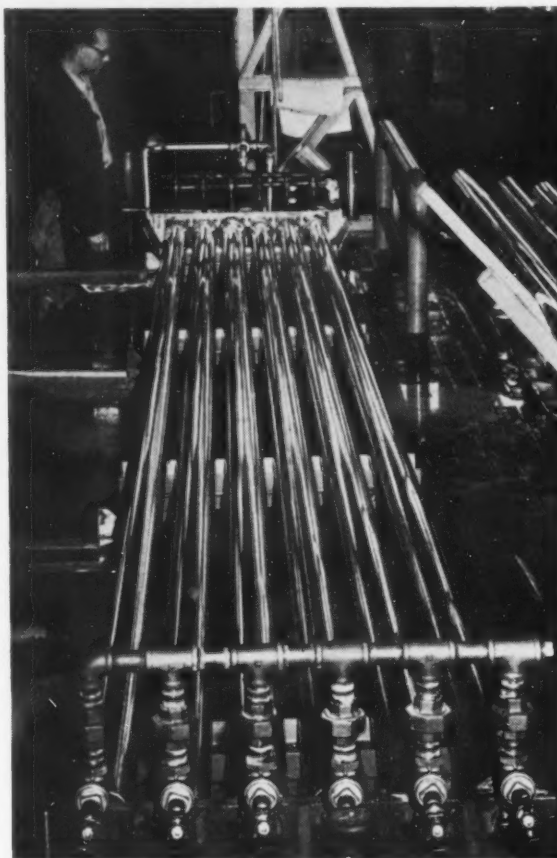
TOP VIEW of Yoder Mill showing pipe going through last stand of forming rolls and into coils of 50-kw electronic induction heater.

sides aluminum at Kaiser, the mill has major application possibilities in the nonferrous field. A similar machine has been delivered to Bridgeport Brass Co., Bridgeport, Conn. Others on order for Aluminum Co. of America will probably go to Alcoa in Tennessee for use on pipe and tubing. The U. S. Navy also has a mill of this type on order for experimental use, it is reported. Several special types of welded high strength tubing and furniture components are being studied. On the latter, lack of a fillet such as used in resistance welding has made the tubing easy to bend to shape without breakage at the seam.

In breakage tests, the tube cracked before the weld. The wider range of tempers and alloys available, as compared with conventional extruded tubing, could open the way for important new applications of aluminum tubing.

Initially, the mill is being used on 4-in. OD 0.047-in. wall pipe. A limiting factor on speed so far is the 50 kw output from the induction heater, which can be increased. The machine is stopped when one coil of aluminum is consumed

and another threaded through. A butt-welding unit has been ordered and a looping pit or other accumulating arrangement will be worked out so that strip can be fed continuously.



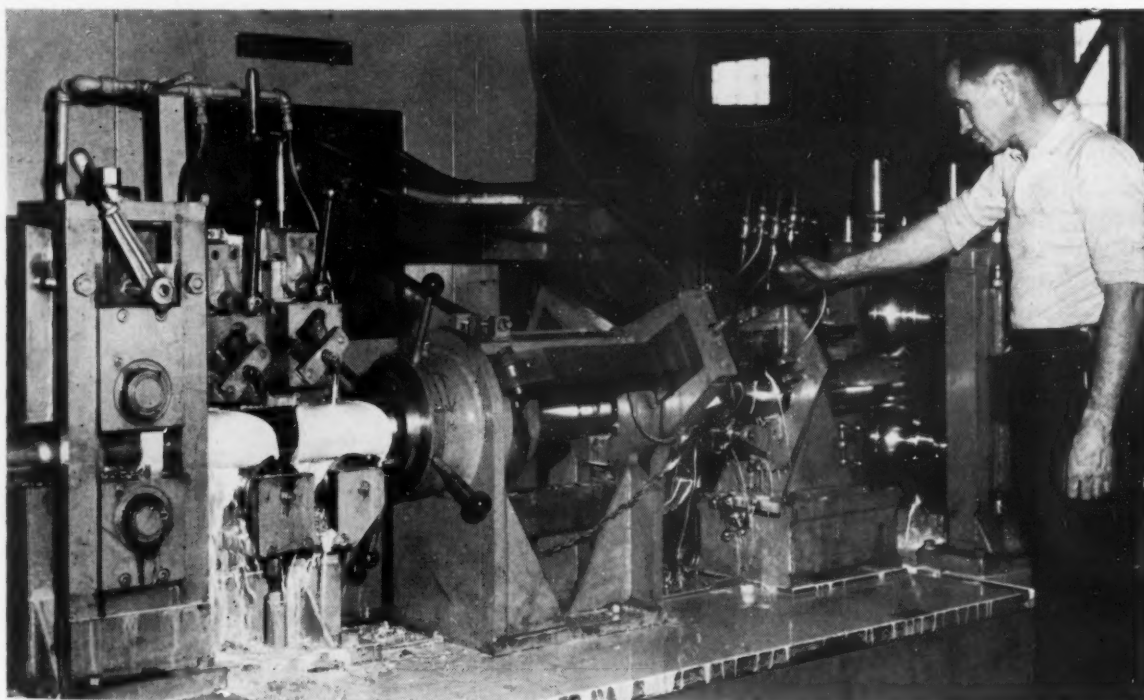
SIX PIPES AT ONCE are hydraulically tested to 300 psi immediately after leaving welder. Next comes cleaning operation to remove oil.

TABLE III

RANGE OF TUBE SIZES PRODUCED

Tube Diam	Maximum Wall Thickness	Minimum Wall Thickness*
in in.	in in.	in in.
3/4 to 1 in.	0.100	0.025
1 1/16 to 1 5/16	0.100	0.025
1 3/8 to 1 11/16	0.125	0.030
1 3/4 to 2 3/16	0.125	0.030
2 1/4 to 2 3/4	0.125	0.035
2 13/16 to 3 1/16	0.134	0.035
3 3/8 to 4	0.134	0.040

* Minimum and maximum gages are approximate, and vary with the alloy of tube produced.



CLOSE-UP OF HEATING COILS, right, and trimming heads with cutters, left. Cutting heads

remove the excess bead from the welded seam. Finished tubing is coming out of the mill at left.

Scrap Preparation Program Improves Steel Quality

By E. W. Hunziker

Superintendent, Openhearth Dept.
Columbia-Geneva Div.
U. S. Steel Corp.
Pittsburg, Calif.



♦ **PURCHASED SCRAP** comprised about 30 pct of all metal charged into the furnaces during 1953 in the Open Hearth Shop of U. S. Steel's Columbia-Geneva Steel Div., Pittsburg, Cal. The remainder was home scrap, pig iron and cast iron of a narrow chemical composition range. Because purchased scrap was of variable nature, an effort was made to improve this part of the charge and thus avoid heat diversions due to high residual alloy content, excessive charging times and furnace delays due to lack of scrap segregation.

Scrap preparation is important to the quality and production economics of steel. Variations in scrap density and silicon content have an effect on fuel requirements, production rates and life of the furnace. By improving materials control practices, better reproducibility and better furnace time should be achieved.

Charging time depends on three factors: (1) The amount of scrap used in the charge; (2) facilities and equipment at the mill for stocking and charging; and (3) the weight of the scrap per charging box. The amount of scrap used in the charge depends on the type of operation for which a given hearth shop is designed. A mill using a high scrap charge has a much greater problem than one using a relatively low scrap charge.

Quality and production rates can be improved best by the combined effort of scrap dealers and consumers. Facilities and equipment at the mill for handling scrap are the responsibility of the scrap consumer. Factors such as increased charging box size, transportation equipment, larger magnets and communications equipment, should be re-evaluated continually.

The weight of scrap per charging box is a

A paper on this subject was presented by Mr. Hunziker at the Annual West Coast Regional Technical Meeting of the AISI in San Francisco, Nov. 6, 1953.

function of the dealer and the consumer. Better scrap preparation is the dealer's concern and improved loading of scrap into charging boxes is up to the mill stockers. Use of oxygen and other improvements for faster melting will not be fully effective if faster charging is not achieved.

Residual element buildup in steel has been a problem to all scrap consumers, particularly those using a high-scrap, low-pig iron charge. Without dilution by a high percentage of hot metal, a point is reached where residual elements have an adverse effect.

Residual elements harmful

The maximum limit for residual elements is not the same for all types of finished steel. In the case of carbon steel plates for firebox and boiler use, residual copper, nickel, chromium, molybdenum and tin, within the ranges normally encountered, have no detrimental effect on tensile and impact properties. However, in many applications, notably tinplate, skelp, drawing and enameling sheets, high carbon wire, and certain hot-working and welding steels, residual element content is a serious problem.

At the Pittsburg, Cal. plant, where more than two-thirds of openhearth production consists of heats for wire products, the presence of residual elements in excess of relatively low limits is harmful in several respects. The majority of wire heats are low-carbon rimmed grades subject to mill specifications of 0.30 pct max Cu, 0.070 pct max Sn; the percentage of copper plus four times the percentage of tin must not exceed 0.450 pct.

Exchange of views necessary

When residual content exceeds 0.450 pct, steel tends to overoxidize in heating. On subsequent rolling, slivers may be produced which result in mill cobbles and rapid wear of wire-drawing dies. Heats exceed residual specifications are diverted to lower grade products, or to the heavier gages where their effects are less harmful.

Residual alloying elements in high-carbon wire gradually decrease ductility of the product to a point where stock is considered brittle by wire drawers. The specification limiting the

♦ If purchased scrap is poorly prepared and segregated the quality and cost of steelmaking suffers . . . A positive program to improve scrap preparation combines the efforts of dealers and consumers.

♦ Heats for wire products containing excessive residual elements are diverted to lower-grade or heavier-gage products . . . Dealers are taken on plant tours and informed of mill problems . . . Purchasers visit scrap yards to discuss requirements and become familiar with dealers' problems . . . Marking system identifies scrap source . . . Bundles and miscellaneous scrap have improved considerably since the program started.

amounts of residual elements in these heats is a hardenability factor'. It is derived only from the residual elements copper, nickel, chromium, molybdenum and vanadium. The maximum hardenability factors for high-carbon heats are:

Type of Wire	Maximum Hardenability Factor
Spring	1.35
Tire-Bead	1.25
Rope	1.25
No-Sag	1.25

High-carbon heats exceeding these specifications must be diverted to other applications.

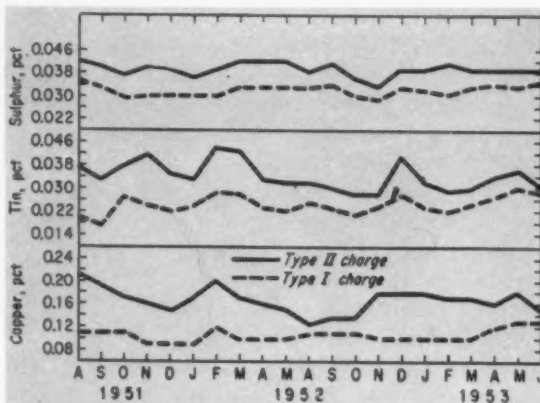
Improvement in the scrap preparation program depends largely on informing scrap dealers of problems faced by the mill. Dealers' representatives, including owners and yardmen, are taken on plant tours. Unsatisfactory conditions are pointed out and required improvements explained. These include less contamination by tramp metals and nonmetallic materials, better physical shape of baled sheets and improved preparation of miscellaneous scrap.

Identification system started

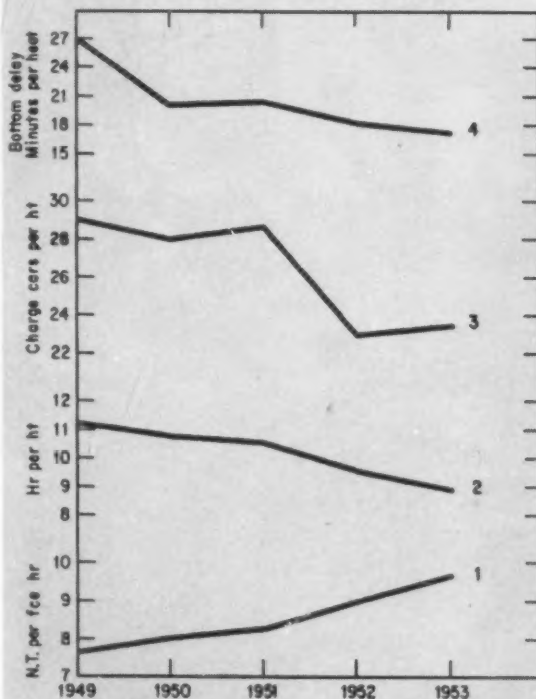
Purchasing representatives visit various scrap suppliers within the area to discuss scrap requirements. During these visits, representatives also become familiar with the dealers' problems. Visits include talks with yardmen who prepare the scrap and advice is given during actual preparation.

A continuous followup has been maintained since the start of the program. The point is always stressed that contaminated scrap is undesirable because of the adverse effect of high residual element content in steel made from such scrap. Data is furnished to dealers on the value of nonferrous material which could be segregated rather than allowed to remain mixed with steel scrap.

Early in 1953, the Pittsburgh Plant instituted a dealer identification system for baled sheets to trace responsibility for scrap of poor physical shape and content. The system provides for painting a characteristic and distinctive mark on bales, using a different color of paint for each of 26 sources. Lists, showing the marking used by each dealer, are carried for reference by all mill personnel concerned. Identification



MONTHLY AVERAGES of residual contents of heats using two types of charges show lower average residuals in higher quality heat grades. In Type II heats, residuals are not excessive.



IMPROVEMENT in net ton production per furnace operating hour is the result of the scrap preparation program. Time and charged cars required per openhearth heat have been decreased as a result of the program.

"Since the start of the program, physical shape of bundles has been satisfactory and contamination is less of a problem . . ."

of baled sheets on incoming cars is now easier and more positive than depending on car numbers alone.

The primary advantage is in the positive source identification of material after it has been unloaded from the car. Before adoption of this system, virtually nothing could be done if poor bundle shape or content was found after bales were unloaded because it was seldom possible to make positive source identification. The system definitely encourages better scrap preparation since dealers realize that should scrap be poor enough, it will warrant rejection or down grading.

The condition of dealers' bundles has improved considerably since this program started. Physical shape has been satisfactory, and contamination, as determined by cutting open bundles for spot inspection, has been less of a problem.

Visual inspection is made of every carload of scrap received. In addition, each carload of baled sheets has two bales removed, one from each end of the car. These are torch cut for internal inspection. Poor bundle shape, tramp

metals or nonmetallic material found in the interior of any bale is cause for rejecting the entire car.

Miscellaneous scrap containing closed tanks, off-size, or poorly-prepared material is also cause for rejecting the entire car. Miscellaneous scrap found to be of poorer grade than that contracted for is down graded, and a lower price negotiated, or the car is rejected.

The practice of rejecting and returning contaminated scrap rather than accepting it at a reduced price is based on several considerations. Dealers are told repeatedly that scrap of good quality is wanted and that contaminated scrap will not be accepted. Thus, the policy of constant surveillance is consistent with the dealer education policy.

Use of a high-scrap, low-pig iron charge, does not permit any known contaminated scrap to enter the charge if the adverse effects of residual elements are to be avoided. The overall scrap supply situation in the Pittsburgh area is not as critical as in many localities, thus permitting greater selectivity of dealers.

Rejection of scrap results in the dealer pay-



BALES OF SHEET SCRAP now received are of suitable size and shape, and are well bundled.

By comparison, material from previous shipments at top of pile lacks compactness and shape.



MISCELLANEOUS NO. 2 SCRAP piles contain satisfactory material. Pieces are of good size

and cables are cut to proper length. Occasionally, these piles contain pieces of oversize scrap.

ing transportation charges both ways, in addition to the cost of rehandling the scrap. Knowing this, dealers establish segregation practices in their own operations to avoid shipment of materials which are out-of-specifications. If scrap is contaminated the Purchasing Dept. notifies the dealer and every effort is made for the dealer to visit the mill and see why the scrap is being rejected.

Utilization of purchased scrap has been more effective since July, 1951, with the use of two distinct types of charges. This practice is based on several years experience in using special charges. One type contains a minimum of baled sheets and miscellaneous scrap for the higher quality steels demanding low residual alloy content. The second type allows larger amounts of purchased scrap for lower quality steel requirements. This practice, forced a substitution of a portion of No. 2 baled sheets by more desirable scrap, resulting in increased inventory of scrap considered undesirable with regard to both physical characteristics and residual content.

Plots of monthly averages of copper, tin and sulfur contents of heats made using Type I and Type II charges show that use of two

types of charges has led to lower average residuals on the higher quality (Type I) heat grades. It is equally obvious that the average residual content of Type II heats is not so excessive as to cause difficulty in applications where these heats are used.

Both types of charges yield average residual alloy contents under the specification. However, difficulties due to high residuals have not been overcome since individual heats may vary considerably from the plotted monthly averages. Also, these plots represent performance after the scrap improvement program was put into effect. A slight downward trend in copper and tin content of Type II heats was not expected and may reflect better segregation practices by scrap dealers.

Two significant conclusions can be made after using the two types of charges. First, lower residual element content results in heats produced from better quality scrap. This is necessary to produce high-carbon wire heats for rope wire, tire-bead wire, and spring wire. Second, bundles and miscellaneous scrap need close inspection in some yards for removal of nonferrous and nonmetallic materials.

The importance of scrap preparation is em-

"Visual inspection is made of every carload of scrap received and two bales are cut open by torch for internal inspection . . ."

"Use of two types of charges has led to lower residual element content in better quality heats for high-carbon steel wire . . ."

phasized by the increase in net tons produced per furnace operating hours (charge-to-charge time), and conversely, the decreased hours per heat and charge cars required per heat. Increased production is due only partly to improved scrap preparation since a program to improve furnace firing practice has also been in use during the last 2 years.

Since 1951, more than 1½ hr has been cut from the heat time. Average heat time for a 3-month period during 1953 has been 2 hr less than for 1951. The reasons for this are: (1) The decrease from 28 to 23 in the number of charge cars required per heat, a drop of 18 pct representing 15 min; (2) decrease in bottom repair delay time due to more uniform scrap and better segregation of nonferrous material such as lead and babbitt; (3) decrease in percentage of purchased scrap charged from a high of 43 pct in 1951 to 32 pct in 1953; and (4) improved furnace firing practice.

Scrap preparation influences economic control of the process to a large degree by its effect on scrap density in the charging boxes. Pittsburgh Works uses a box of 20 cu ft capacity.

Considering its use for relatively small furnaces, it is consistent with industry-wide box sizes².

Average density of scrap as loaded into charging boxes had increased from 1949 to 1953. This increase was determined by calculating a weighed average scrap density for one representative month each year, the weighed average being the sum of the products of densities of each grade times the percent of that grade used.

Little or no difference in density of home scrap and pig iron was noted, but a comparison of purchased scrap density before and after the start of the improvement program shows an increase in density in nearly every grade. A comparison of the present average weight of scrap, 104 lb per cu ft of charging box volume, is more dense than the industry average.

REFERENCES

- ¹ Grossman, Marcus A., Metal Progress Data Sheet No. 29, 1943.
- ² Denlinger, C., Preparation and Charging of Scrap, AIME Open Hearth Proceedings, 1947, vol. 30, pp. 53-55.



GOOD SIZE and cleanliness of present shipments of Miscellaneous No. 1 scrap rate them

as being of good quality. Steel scrap has been segregated from nonferrous contaminants.

TITANIUM DESCALED SUCCESSFULLY With Sodium Hydride



By Marshall Sittig

Ethyl Corp.
New York

- ◆ Oxide scale on hot rolled titanium is successfully removed in a sodium hydride bath by Universal-Cyclops Steel Corp. . . . Even in titanium sheets as thin as 0.015 in., the bath works successfully without burn-through if temperatures are carefully controlled.
- ◆ Danger of hydrogen embrittlement is also eliminated at the low bath operating temperatures, 680° to 720°F . . . After the hydride bath titanium is given a water quench where residue from the descaling bath is removed . . . This is followed by two acid washes and a final water rinse.
- ◆ Sodium monoxide is used to control "humidity" of the bath . . . The sodium hydride descaling treatment is odorless and fumeless . . . There is virtually no pollution problem . . . Reduced material is occasionally removed by means of sludge pans.

◆ **REMOVAL OF OXIDE SCALE** from hot rolled titanium has presented titanium producers with several production problems. Considerable success has been attained in overcoming these problems at Universal-Cyclops Steel Corp. of Bridgeville, Pa. Pure titanium in plates up to 1 in. thick and in sheets as thin as 0.015 in. have been descaled successfully with sodium hydride.

In early work with very thin sheets, the titanium burned upon withdrawal from the hydride bath. Difficulty centered at the base of the sheets, where dragout accumulated be-

tween sheets which were closely spaced in the rack. Sufficient heat was generated to burn large holes through the sheets, even though the rack was transferred to the water quench bath as rapidly as possible.

Operation of the sodium hydride bath at 680 to 700 F, taking care never to go above 700 F, eliminated this problem. No fires have been experienced since these conditions have been maintained. At the low operating temperatures used in sodium hydride descaling, 680 to 720 F, there is no danger of hydrogen embrittlement, as there might be in plain sodium hydroxide

Straight chrome steels and stainless grades have been successfully descaled with sodium hydride . . .

because of the high temperature necessary for scale removal.

After 15 minutes in the sodium hydride bath, the rack holding the titanium plates is transferred to a water quench bath where residue from the descaling bath is removed. A dual acid wash follows. First, an 8 pct sulfuric acid bath at 100 F is used for 1 minute. A second bath contains nitric acid, 6 pct, and hydrofluoric acid, 1 pct, at room temperature. A contact time of $\frac{1}{2}$ minute is used. A final water rinse completes the treatment.

Sodium monoxide is used to control the "humidity" of the bath. After shutdowns of a week or more, or upon making up a wholly new caustic bath, sodium monoxide is added in varying amounts depending on the specific situation. Usually an addition of from 100 to 400 lb is needed for a caustic bath of approximately 132 cu ft volume.

In addition to satisfactory use on titanium sheets, Universal-Cyclops has found sodium hydride superior for descaling straight chrome steels and other stainless grade.

A second interesting application of sodium hydride descaling has been to half-round coiled stock for jet engine turbine blades. In this operation, raw stock for vanes and blades for the powerful J-47 aircraft gas turbine is produced. Cold rolled and annealed coils are treated in the sodium hydride bath for 10 minutes at 720 F. After the water quench treatment, stock is washed in an 8 pct sulfuric

acid bath for 5 minutes at 120 F. This is followed by a 2 to 3 minute dip in a 6 pct nitric acid containing $\frac{1}{2}$ to 1 pct hydrofluoric acid. Bath temperature is 100 F. A final water rinse is used.

Operations such as these at Universal-Cyclops are typical of the expanding uses for sodium hydride descaling. The technology of new metals, such as titanium and hafnium, has broadened the applications of this process, already used successfully in descaling of stainless steels.

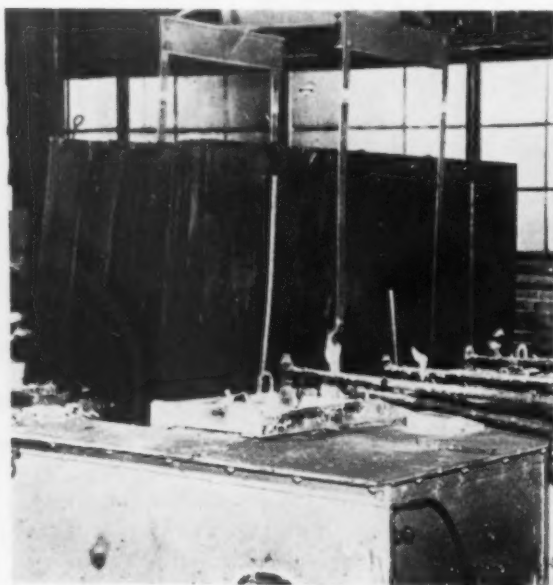
Sodium hydride descaling has the advantages of being an odorless and fumeless process. In addition there is virtually no pollution problem as compared to pickling which offers a considerable acid waste disposal problem. In sodium hydride descaling, reduced material is removed occasionally by way of the sludge pans.

The bath contains sodium hydride dissolved in sodium hydroxide. A concentration of 1.5 to 2.0 pct of sodium hydride usually is used. Concentration of sodium hydride can be simply checked by treating a sample of salt from the bath with water and measuring the volume of evolved hydrogen.

Bath temperature automatically controlled

Tank used in hydride descaling is made of plain low-carbon steel. The bath may be heated by gas-fired coils, gas-fired immersion heaters, electrical resistance heaters, or by immersion electrodes, using the bath itself as the resistance element. In any case, bath temperature is automatically controlled.

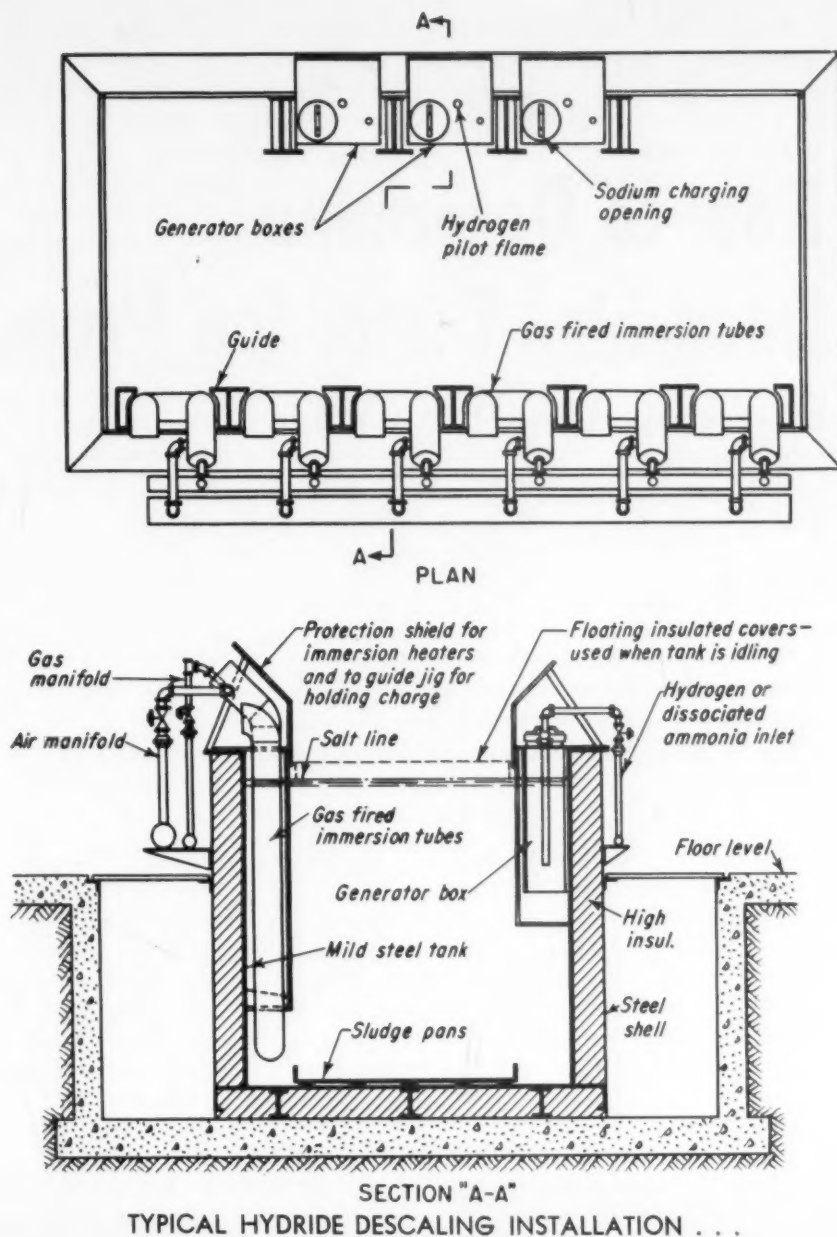
The hydrogen is usually made by the dissociation of ammonia, although cylinder hydrogen can be used. Metallic sodium, often as a 5-lb brick, is introduced to the hydride generator boxes at the side of the bath.



TITANIUM TAKES A BATH . . .



RINSING AFTER DESCALING . . .



A 5-LB BRICK OF SODIUM IS ADDED TO THE DESCALING BATH . . .

How to Determine Quenching-Distortion Properties

By J. E. Campbell

H. O. McIntire

Battelle Memorial Institute
Columbus

Part III

♦ Favorable stresses improve fatigue life . . . The greater the stresses the more the distortion . . . Water quenching produces higher stresses and more warpage than oil . . . Minimum distortion is obtained on steels with just enough hardenability to harden through . . .

♦ HEAT TREATING can be used to produce residual stress patterns for prolonging fatigue life of steel parts. Residual stresses induced by heat treatment, however, can also cause warpage in heat treated parts. To overcome this, a quenching-distortion test was developed by Battelle Memorial Institute to determine what steels and heat treatments should be used to hold distortion to a minimum. These tests also help to explain the mechanism of distortion.

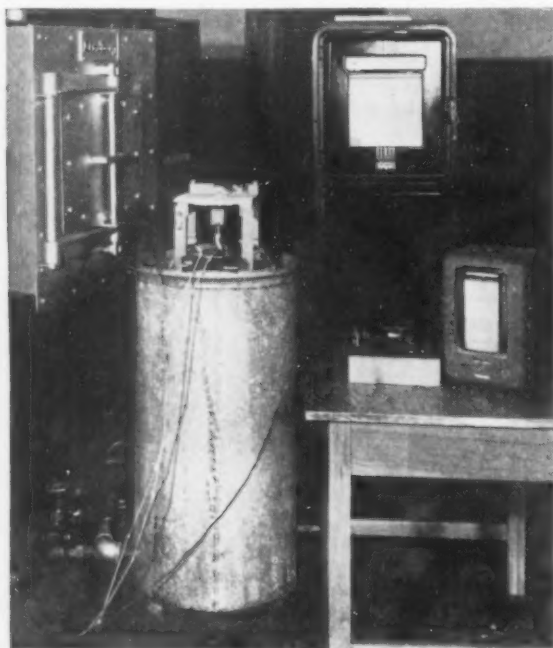


FIG. 1 — Quench-distortion equipment has quench fixture located over quench tank.

At Battelle, flat specimens 1 in. thick by 3 in. wide and 6 in. long were quenched only on one side, so that stresses set up within the specimen would be translated into distortion at the middle of the specimen. By measuring the temperature at the hot and quenched faces and the distortion in the specimen during the quenching operation, effects of physical changes within the specimen were followed.

A quenching fixture was constructed so that oil or water from a 1¼-in. pipe could be directed against the bottom surface of the specimen. The upper end of the pipe was 1⅛ in. from the bottom surface of the specimen. In order to obtain a uniform flow of quenchant over the bottom of the specimen, the free height of the water column was adjusted to 2¾ in. When oil was used, the column was adjusted to 7 in. The quenching fixture was located over a tank equipped with a circulating pump and a quick-opening valve as shown in Fig. 1.

The fixture was hinged so that the hot specimen could be put in place quickly. The specimen rested on two short lengths of quartz tubing on one end, and a similar length of tubing on the other end. After the specimen was in place, the hinged cover of the fixture was closed, bringing a quartz rod into contact with the middle of the specimen. This quartz rod actuated a spring bar

Part III of a study on residual stress in heat treating sponsored by the Springfield Armory as part of a program to improve the performance of small arms components. Part I and II of this study conducted at Battelle Memorial Institute, appeared in the Nov. 12 and Nov. 26 issues.

and the movement was followed with Type SR-4 strain gages.

The circuit diagram and a drawing of the quenching fixture are shown in Fig. 2. The strain gages were connected through a bridge circuit to a recording millivoltmeter. A spring bar similar to that on the quenching fixture was located in the central box and was used for quickly balancing the circuit after each specimen was in place. Two strain gages were attached to this spring.

Deflection of this bar and resistance of the attached gages, was adjusted with a screw. Before using, the equipment was calibrated with gage blocks. Using a 1½-volt input to the bridge circuit, a movement of the quartz rod of 0.023 in. in either direction produced a change in output of 0.10 millivolt.

The recording millivoltmeter was set to give full-scale deflection with one millivolt output from the bridge circuit. At the start of each

test, the circuit was adjusted so that the millivoltmeter scriber was at midpoint on the chart or 0.50 millivolts.

Temperatures of the hot and the quenched faces of the specimens were recorded on a two-point Speedomax strip-chart recorder. Two Chromel-Alumel thermocouples were attached to each specimen by peening into the top and bottom surfaces, two inches from one end and midway between the sides.

Continuous curves for the distortion at the middle and for temperatures at the top and bottom surfaces of each specimen were made from the steels listed in Table 1. Both direct and delayed methods of quenching were employed. Water quenching was used for specimens of 4150 steel and steels having lower hardenabilities. Final distortion was measured with a straight-edge and feeler gages. Data obtained from each test are given in Table 2, and typical curves for distortion and surface tempera-

TABLE 1

STEEL COMPOSITIONS, M_s TEMPERATURES, AND HARDENABILITY

Steel Type	Composition, pct									Calculated M_s Temp., °F*	Hardenability, sixteenth in. to 50 R _c	Ideal Diameter for 95% Martensite, in.
	C	Mn	P	S	Si	Ni	Cr	Mo	Other			
430	0.10	.....	.....	.....	.....	.....	14.7	.....	.....	736	.....	2.7
94B17	0.18	0.80	.....	.....	0.27	0.55	0.62	0.15	B	687	14 (30 R _c)	1.4
9820	0.22	0.82	0.023	0.022	0.28	0.59	0.46	0.19	.....	619	4 to 5 (30 R _c)	4.25
4333	0.32	0.62	.....	.....	0.19	2.00	0.79	0.24	.....	572	10	4.9
4340	0.40	0.70	0.008	0.023	0.21	1.87	0.68	0.23	.....	572	32+	2.2
61B40	0.42	0.85	.....	.....	0.27	0.38	0.47	0.10	B	615	8	2.2
8745	0.47	0.88	.....	.....	0.34	0.55	0.48	0.22	.....	577	8	2.2
Cr-Mo-V	0.48	0.82	.....	.....	0.23	0.06	1.00	0.36	0.20V	580	14	2.9
14B45	0.51	0.76	.....	.....	0.21	<0.10	<0.10	<0.10	B	605	5	1.6
51B45	0.51	0.97	.....	.....	0.27	0.28	0.91	0.10	B	546	40+	5.7
4150	0.55	0.90	.....	.....	0.28	0.10	0.92	0.18	.....	529	24	3.4
8660	0.58	0.78	.....	.....	0.20	0.61	0.54	0.21	.....	522	20	3.8
1060	0.61	0.80	.....	.....	0.30	.....	.....	.....	.....	546	2 to 3	1.4

* Metals Handbook, page 611, fourth equation, (1948 edition).

TABLE 2

QUENCHING DISTORTION DATA

Steel Grade	Carbon, %	Hardenability 1/16 to 50 R _c	Oil-Quenched Specimens							Water Quenched Specimens						
			Calculated M_s Temp., °F	Temperature at Start of Quench, °F	Initial Upward Distortion, in.	Total Distortion, in.	Final Distortion, in.	Distortion From Quenching Temp., in.*	Hardness, R _c	Temperature at Start of Quench, °F	Initial Upward Distortion, in.	Total Distortion, in.	Final Distortion, in.	Distortion From Quenching Temp., in.**	Quenched Face	Top Face
4340	0.40	32+	572	1500	0.023	0.039	+0.015	+0.017	47 48	.....	.....	.....	.....	.....	.....	.....
				1350	0.016	0.030	+0.008	+0.013	45 48	.....	.....	.....	.....	.....	.....	.....
				1470	0.019	0.036	+0.013	+0.013	59 58	.....	.....	.....	.....	.....	.....	.....
51B45	0.51	40+	546	1350	0.014	0.033	+0.008	+0.009	55 55	.....	.....	.....	.....	.....	.....	.....
				1450	0.017	0.035	+0.010	+0.009	56 56	1500	0.034	0.062	+0.009	+0.009	62	59
4150	0.55	24	529	1350	0.015	0.030	+0.009	+0.011	58 58	1350	0.028	0.054	+0.008	+0.008	62	59
				1200	0.017	0.030	+0.011	+0.017	58 56	1200	0.026	0.047	+0.010	+0.011	62	56
				1470	0.019	0.029	0.000	-0.001	53 49	1500	0.037	0.072	Specimen cracked	.....	62	60
8660	0.58	20	522	1500	0.014	0.024	0.000	-0.002	55 55	.....	.....	.....	.....	.....	.....	.....
Cr-Mo-V	0.48	14	580	1350	0.016	0.027	-0.004	-0.002	56 52	.....	.....	.....	.....	.....	.....	.....
				1500	0.021	0.033	-0.002	+0.004	40 36	1500	0.031	0.063	+0.010	+0.007	47	43
4333	0.32	10	619	1500	0.024	0.032	+0.001	-0.001	50 38	.....	.....	.....	.....	.....	.....	.....
61B40	0.42	9	615	1350	0.022	0.029	0.000	+0.003	47 37	.....	.....	.....	.....	.....	.....	.....
				1480	0.023	0.037	-0.002	-0.001	51 35	1480	0.022	0.062	-0.021	-0.020	60	51
				1330	0.022	0.032	-0.003	+0.001	51 34	1350	0.011	0.051	-0.021	-0.020	58	52
				1200	0.016	0.020	-0.001	-0.009	50 35	1200	0.011	0.041	-0.012	-0.008	54	45
14B45	0.51	5	605	1470	0.018	0.022	+0.004	+0.006	25 18	1480	0.014	0.056	-0.032	-0.031	56	24
				1350	0.012	0.012	+0.006	+0.006	14 11	1350	0.005	0.045	-0.030	-0.030	53	25
1060	0.61	2½	546	1470	0.014	0.023	-0.003	+0.001	33 25	1490	0.016	0.049	-0.023	-0.022	58	30
8620	0.22	.....	697	.....	.....	.....	.....	.....	.....	1545	0.008	0.032	-0.010	-0.015	38	27
430	0.10	.....	.....	1475	0.021	0.031	0.000	+0.001	14 12	1500	0.025	0.041	-0.003	-0.006	16	10
				1350	0.016	0.028	0.000	+0.001	13 13	1350	0.016	0.033	-0.006	-0.007	15	10
Carburized Specimens																
94B17	0.18	.....	736	1560	0.024	0.028	+0.012	+0.011	51 21	1560	0.023	0.037	+0.015	-0.003	59	34
				1500	0.023	0.025	+0.009	+0.011	52 20	1500	0.025	0.032	+0.009	+0.004	59	31
				1400	0.024	0.024	+0.010	+0.014	51 21	1400	0.018	0.027	+0.009	0.000	60	30
9820	0.22	.....	697	1580	0.025	0.025	+0.010	+0.012	57 21	1630	0.031	0.056	-0.022	-0.015	57	28
				1490	0.016	0.016	+0.009	+0.013	60 22	1520	0.027	0.046	-0.019	-0.014	57	27
				1400	0.018	0.018	+0.009	+0.016	62 18	1400	0.019	0.040	-0.017	-0.011	58	28

* For oil quenching, 0.013 inch was added to the value taken from the chart.

** For water quenching, 0.011 inch was added to the value taken from the chart.

Plus values indicate concavity in the bottom (quenched) face of the specimen.

Minus values indicate convexity in the bottom face of the specimen.

Distortion after quenching started was upward, indicating concavity in the surface . . .

tures obtained for through-hardening steels are shown in Figs. 3 and 4. Fig. 3 shows the curves for 4150 steel water quenched from the austenitizing temperature of 1550°F. Fig. 4 shows curves for the same grade of steel oil quenched.

Because of contraction in the thickness of the specimens on cooling from the austenitizing temperature and some slight heating of the fixture during the quenching operation, the distortion curves were displaced progressively downward as quenching proceeded. At room temperature, this displacement averaged about

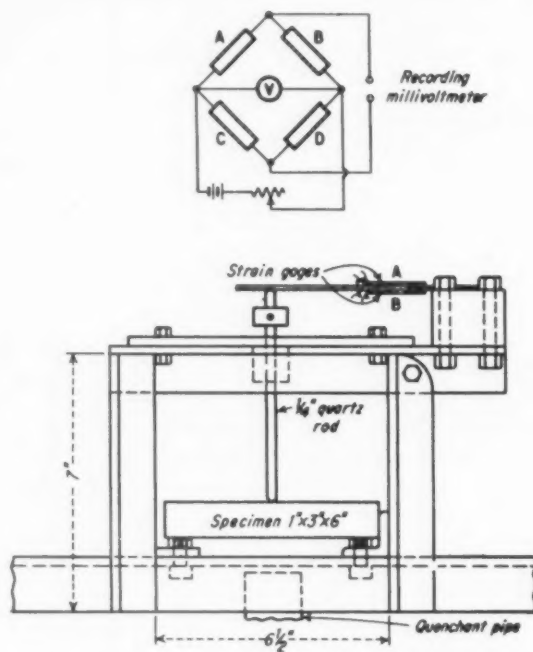


FIG. 2—Circuit Diagram and quenching fixture.

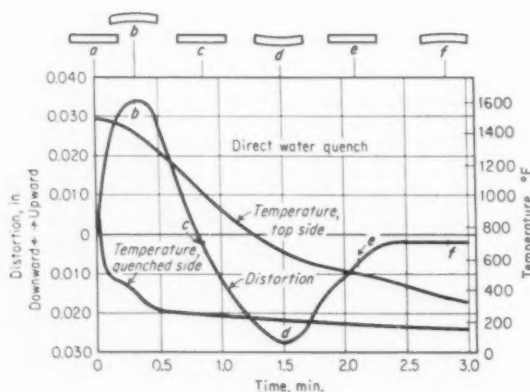


FIG. 3—Distortion and temperature curves for water quenched 4150. Actual distortion at top.

0.013 in. for oil quenching and 0.011 in. for water quenching.

The initial distortion after the start of the quench was upward, indicating concavity in the quenched surface of the specimen. This was caused by the rapid cooling of the bottom surface with accompanying thermal contraction. This initial distortion for 4150 and 8660 steels was appreciably greater for the water-quenched specimens than for those oil quenched.

When water quenching, the quenched surface cooled quickly to about 200°F, at which time the other surface was still about 1175 to 1400°F. When oil quenching, the bottom surface cooled quickly to about 800°F and then cooled slowly from this temperature to the temperature of the oil. This appreciably lower thermal gradient in the oil-quenched specimens produced lower distortion in the specimens. The time of maximum upward distortion closely approached the time of maximum thermal gradient.

Slight benefit from longer delay

With delay quenching, the greatest benefit in reducing upward distortion was derived from the first 100-deg. drop in surface temperature. Only slight further benefit was obtained from longer delay times with accompanying lower surface temperatures.

After quenching below the M_s temperature, the formation of martensite proceeded from the bottom of the specimen, and downward distortion occurred beyond the original position. The downward distortion reached a maximum when the top temperature was about 650°F. This lengthening of the bottom surface with respect to the top surface results from the greater specific volume of martensite compared with that of the austenite remaining near the top surface.

Specimen distorted as cooling continued

As cooling at the top surface continued, the specimen again distorted upward beyond the neutral position. After cooling to normal temperature, the direct water- and oil-quenched specimens of 4150 steel had about 0.010-in. concavity on the quenched face. As mentioned earlier, the position of the curves at the end of the quench is in error by 0.011 to 0.013 in., and these amounts should be added to the positions indicated on the curves for water and oil quenching. It is readily seen that the internal stresses within a specimen of 4150 steel, while being quenched with water, must be greater than for a similar specimen being quenched in oil. The total distortion in the 4150 specimen during quenching, indicated in Table 2, was 0.035 in. for oil quenching and 0.062 in. for water quenching.

Because of the reduced total distortion during delay quenching as shown in Table 2, for the various steels, it is apparent that delay quenching should result in reduced final distortion.

tion. When water quenching, the total distortion increased as the carbon content was increased for the steels (4333, 4150, and 8660) that hardened throughout. This effect was not noted for the oil-quenched specimens.

It will be observed from Table 2 that the oil-and-water quenched specimens which were through-hardening were concave on the quenched side after reaching normal temperatures. Furthermore, the amount of final distortion for the oil-quenched specimens that were through-hardening decreased as the hardenability decreased. This indicates that the hardenability which just provides through-hardening will give the minimum amount of distortion.

Distortion vs. quench media

For the specimens which did not harden throughout, the initial upward distortion for the oil-quenched specimens was about the same as for the through-hardening specimens. Final distortions fluctuated between 0.006 in. concavity and 0.004 in. convexity.

With water quenching, however, the initial upward distortion was appreciably less than for the through-hardening specimens and in some instances was less than for oil quenching. Initial upward distortion was relatively low for the water-quenched specimens that did not harden throughout, because the expansion resulting from transformation to martensite on the quenched face was effective in producing downward distortion earlier in the quenching cycle.

Copper plating prevented carburization

The difference in specific volume for the high-temperature transformation products near the top surface as compared with that of the martensite near the quenched face is the chief reason for the convexity in the quenched face of each specimen of nonthrough-hardening steel. Plastic strain probably occurs in the austenite near the quenched face prior to martensite formation which would also contribute to the convexity in the quenched faces of the water-quenched specimens.

Six specimens each of 8620 and 94B17 steel were pack carburized on one side and then oil or water quenched on the carburized surface. Some specimens were direct quenched and others were quenched after air cooling to temperatures as low as 1400°F. Prior to carburizing, one face of each specimen was copper plated to prevent carburization. The specimens were pack carburized for eight hours at 1700°F and cooled in the box. Thermocouples were then attached and the specimens were reheated to 1700°F in a protective atmosphere furnace.

Distortion curves for the direct-quenched specimens are shown in Fig. 5. The temperature curves are for the 8620 steel. Pertinent data from all the curves are given in Table 2.

For carburized and oil-quenched specimens, the slightly delayed inflection point and the greater secondary upward distortion of the 94B17 steel probably resulted from its greater hardenability. After cooling to normal temperatures, the oil-quenched specimens were concave on the quenched surface.

Metallographic examination and low-temperature treatment indicated that the comparatively low hardness of the case on the 94B17 specimens resulted from partial decarburization during reheating prior to quenching even though a protective-atmosphere furnace was used.

With the water-quenched specimens, the distortion obtained from the curves did not agree with that measured with feeler gages. Apparently some distortion had occurred prior to quenching. The specimens of 8620 steel were convex on the quenched surface. The 94B17 specimens, on the other hand, were concave on the quenched surface. An indication of the greater core hardenability for 94B17 steel is shown by the hardness at the top of the specimen. The top surface hardness of the 94B17 specimens were 30-34 Rockwell C compared with 26.28 Rc for the 8620 steel.

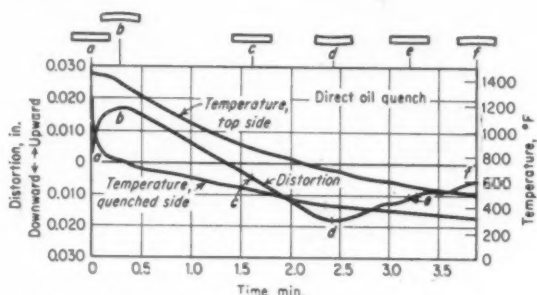


FIG. 4—Distortion and temperature curves for oil quenched 4150.

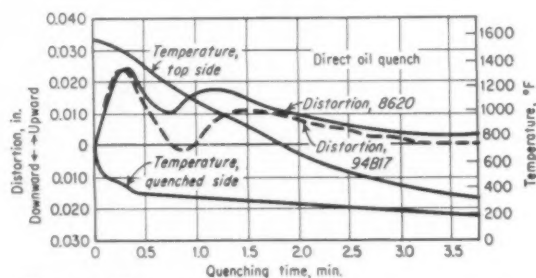
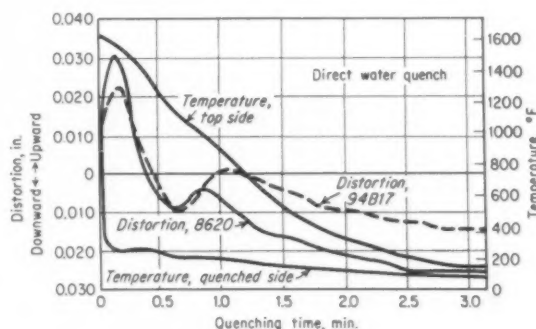


FIG. 5—Distortion and temperature curves for 8620 and 94B17. Carburized on quenched side.

Use plenty of coolant—

Improved Techniques Developed for Grinding Titanium Carbides



By F. J. Lennon, Jr.

General Superintendent
Kennametal, Inc.
Latrobe, Pa.

◆ Special techniques have been developed for grinding the titanium carbides . . . Diamond wheels are recommended, but the more economical silicon carbide wheels may be used if wheel speeds are kept in the low 3500 to 4000 sfpm range.

◆ Wherever possible use plenty of coolant . . . Where parts must be ground dry, wheels specially designed for this type operation are recommended . . . If you use silicon carbide wheels, a wheel of at least 12-in. diam is recommended for economy.

◆ For rough grinding with silicon carbide wheels, 46 to 60 grit wheels are recommended . . . For finish grinding, 90 to 120 grit wheels are recommended . . . For fine finishes with diamond wheels, grits of 120 to 220 may be used depending on finish desired.

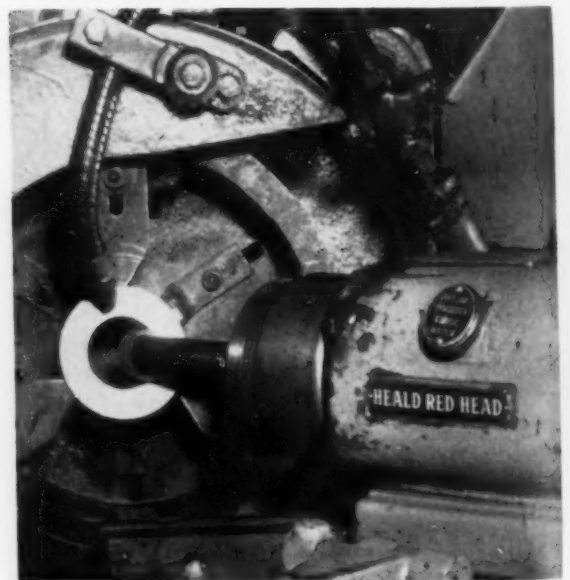


USE PLENTY OF COOLANT when grinding with a resinoid bonded diamond wheel.

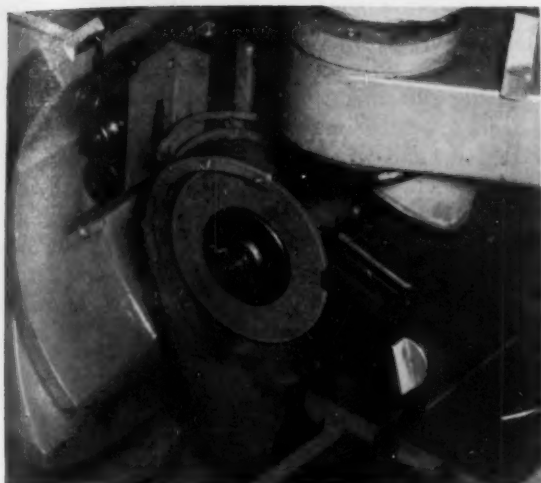
◆ **TITANIUM CARBIDES** produced by powder metallurgy methods have successfully provided materials suitable for many high temperature operating conditions. These new materials resist thermal shock, withstand oxidation and abrasion and retain great strength at temperatures in excess of 1800°F. Successful applications include valves, valve seats, crucibles, hot extrusion die inserts, bushings, thermocouple protection tubes, flame tubes, furnace tong tips, nozzle vanes, and blades for jet engines.

As more of the titanium carbide materials, such as those made by Kennametal, Inc. of Latrobe, Pa., have become available, specialized grinding techniques have been developed. The Kentanium group embraces a variety of high temperature grades. Slight variations in grinding characteristics are experienced when the composition is changed.

SOME TYPICAL SETUPS



Grinding internal chamfer . . .

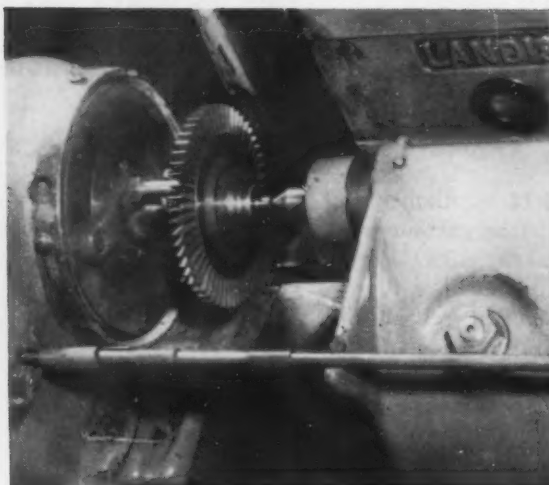


TITANIUM CARBIDE part is ground dry on optical form grinder with resinoid bond wheel.

Diamond grinding wheels provide the most satisfactory method for finish grinding the titanium carbides. Generally, grinding is easier, less wheel breakdown is experienced in comparison with conventional carbide grinding, and wheel costs for the removal of a given volume of titanium carbides are lower. Titanium carbides are, however, more susceptible to cracking than are the regular carbide grades and more attention must be given to use of proper grinding procedure.

In all grinding application, a flood of suitable coolant properly directed onto the wheel is essential. Dry grinding should be avoided wherever possible. Regular soluble oils are generally satisfactory for these grinding applications.

Silicon carbide wheels can be used success-



ROTOR of titanium carbide, mounted in cylindrical grinder, is ready for finish grinding.

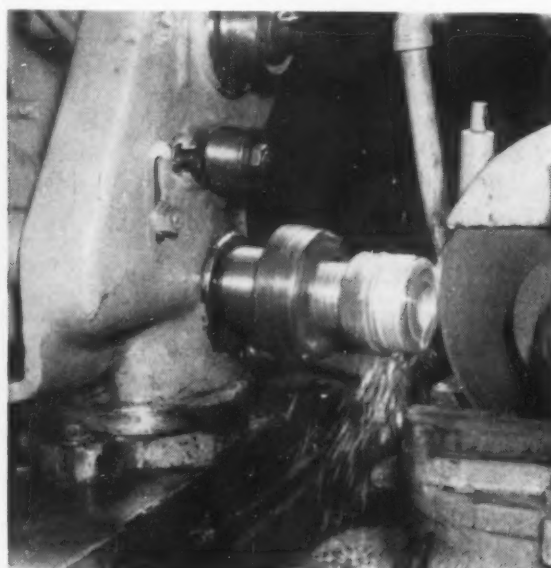
fully to grind titanium carbides but are less satisfactory than diamond wheels. Breakdown on the silicon carbide wheels will, however, be less than that experienced when grinding tungsten carbide grades. As a result, silicon carbide grinding is often more economical than diamond grinding. Best wheel speeds range from 3500 to 4000 sfpm. This reduced speed (normal 5500 to 6000 sfpm) parallels grinding experience with titanium metals.

In diamond grinding it has not been found necessary to change the wheel speeds; however, future tests may indicate some advantages in this respect. Metal bond diamond wheels appear to work better at lower speeds, but more data on this point.

For offhand grinding with silicon carbide wheels, a grinder which allows use of at least



Face plate mounted . . .



Face grinding . . .

"Either vitrified or resinoid-bonded wheels are recommended for internal grinding . . ."

a 12-in. diam wheel is recommended. Smaller silicon carbide wheels are less economical than larger ones. For rough grinding use of silicon carbide in either 46 grit or 60 grit is recommended. A suitable wheel would be a Bay State's IC46-L12-B2, or equivalent wheel from any other wheel manufacturer. For finish grinding with a silicon carbide wheel, a 90 to 120 grit is recommended, depending on finish desired.

For finish grinding with a diamond wheel, a 120 to 220 grit would be used, depending on finish desired. A typical wheel specification here would be Norton's D180-P50-V1/8 in a vitrified bond. In a metal bond wheel Super-Cut's D150-25-200 M 3/32, or equivalent, would be satisfactory. At present, offhand grinding with resinoid bond wheels is not permitted under NPA Regulation M-103 except in special isolated cases.

Where large areas of carbide are to be ground, silicon carbide grinding is generally uneconomical. For small area work, however, satisfactory results can be achieved in many cases with a Norton GC80-K11-VR wheel, or equivalent. For improved finishes the finer grit sizes can be used such as Bay State specification IC100-G9-V2, or equivalent. As large a wheel as possible should be used for better grinding economy.

Where surface grinding with diamond wheels is used resinoid bond wheels are recommended. Grit size can vary from 120 to 220, depending on finish desired. A typical wheel specification

would be Norton's D150-R100 BX7-1/8, or equivalent. Similar wheel specifications are recommended for cylindrical grinding.

Either vitrified or resinoid bond diamond wheels are recommended for internal grinding. Vitrified bond wheels generally result in lower wheel costs while resinoid wheels provide superior finishes. A typical resinoid wheel specification is Norton's D100-R100-B1/8. Silicon carbide wheels are not recommended for internal grinding since wheel sizes are usually quite small and wheel breakdown is too great.

Recommend liberal coolant flow.

Form grinding of titanium carbides using formed silicon carbide wheels can be done successfully if wheel speed is reduced in accordance with our earlier recommendation. A typical wheel specification for this type of work is Carborundum's GC120-H8-VW, or equal.

Formed diamond wheels are also used successfully. Again, resinoid bond wheels only are recommended and a typical wheel specification would be Norton's D180-N100-B1/8. The 180 grit size can be varied as required.

A liberal flow of coolant is recommended in all cases. In some instances dry grinding must be done because of the nature of the work or the design of the machine. In optical form grinding, for example, a coolant cannot be used because of the characteristics of the machine. Where this condition is encountered wheel specifications should be changed to coincide with the dry grinding conditions. For this type grinding Carborundum's D220-L100-BR1/8 wheel, or equivalent, is recommended. This wheel has a special bond for dry grinding.

Titanium carbide harder to polish

Methods used for lapping and polishing Kentanium are generally the same as those followed in lapping and polishing tungsten carbide grades. Diamond dust with a suitable carrier, such as olive oil, works well. The grade or size of diamond dust should be consistent with the surface condition desired. Titanium carbide is slightly more difficult to polish than conventional tungsten carbide compositions, and more time is required to produce a lustrous surface. Very high polishes are not easily obtained, and generally require considerable time and effort. A compromise is usually needed.

For those grinding operations not covered, it is recommended that diamond wheels be tried first, using the wheel that would ordinarily be used in grinding a similar piece made from tungsten carbide. Some modifications may then be tried in wheel specifications for improved performance and lower costs. Silicon carbide wheels should next be tried to determine whether their use is more economical than the use of diamond wheels. An accurate record of grinding costs will prove invaluable in such comparisons.

Grinding Titanium Carbides

- || Use liberal coolant flow wherever possible.
- || Soluble oils should be used in all grinding operations. Mixes should be consistent with those used in conventional carbide grinding.
- || Keep diamond grinding faces clean by occasional dressing. If frequent dressings are required, a change in the coolant is recommended.
- || Where silicon carbide wheels are used, use largest possible wheel diameter.
- || Keep silicon carbide wheels speeds between 3500 and 4000 sfpm for fixed feed grinding.
- || Use resinoid bond diamond wheels on fixed feed grinding of titanium carbides, not metal bond wheels. For internal grinding, vitrified diamond wheels generally give equally good results at lower costs.
- || When diamond wheels are used, machine condition and proper mounting of the wheel are especially important. The machine should be large enough for the job, and spindle bearings should be in good condition. Wheel runout should never exceed 0.001 in.

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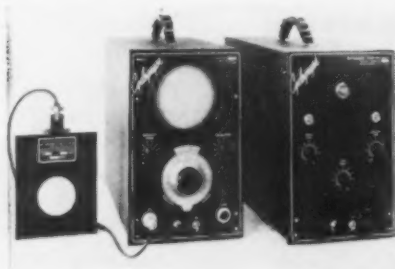
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MICHIGAN

Technical Briefs

Engineering

Maintenance:

**New coolant cleaning tank
reclarifies quench oils.**

One of the largest industrial coolant tanks ever built has been shipped in sections to the Ford Motor Co. forge plant at Canton, Ohio, where it will be used to reclarify quench oils

No Sump Cleaning

The 57-ft long magnetic separator had to be broken down into three sections and mounted on two flatcars for shipment. The 18,000-gal capacity of the huge oil clarifier could hold the entire contents of two railroad tank cars.

The Magnaflo Separator, built by the United States Hoffman Machinery Corp., Syracuse, N. Y., removes 75 to 90 pct of ferrous solids. It is designed for continuous operation and is fully automatic and self-cleaning. It eliminates the messy chores of cleaning sumps, changing filter papers, bags or cartridges.

Has Scraper Flights

The big separator consists of three basic parts—the tank itself, the magnetic plate, and the sludge scraper mechanism. The tank is a leak-proof, one-piece welded steel unit.

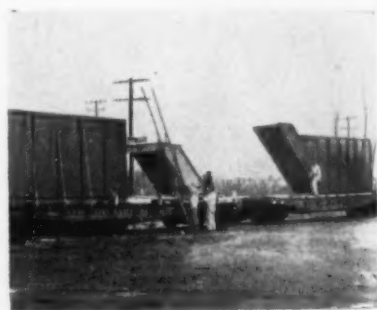
The magnetic plate containing shielded Alnico permanent mag-

IF YOU WANT MORE DATA

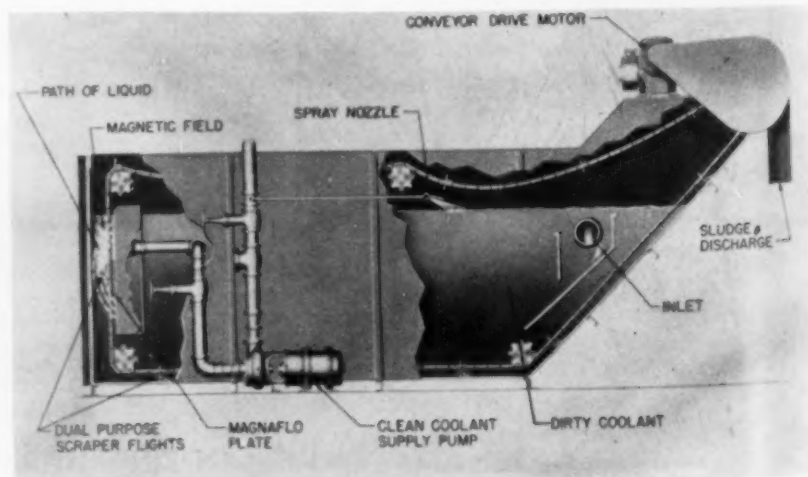
You may secure additional information on any item briefed in this section by using the reply card on page 103. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

nets, is suspended below the oil level where it is effective 100 pct of the time. Scraper mechanism consists of a series of scraper flights mounted on a drag chain conveyor, motor-driven at very slow speed for effective sludge removal.

Similar separators have been constructed for all types of industrial oils and coolants, ranging in flow rates from 10 to 1000 gpm or more.



Shipped in sections . . .



Big coolant tank will clean Ford quench oil . . .

Furnace:

Allegheny Ludlum installs new fast slab heater.

A new type of slab heating furnace which can heat up to 70 tons per hour of stainless steel, silicon (electrical quality) steel, or carbon steel from room temperature to 2275°F has just been put into operation by Allegheny Ludlum Steel Corp. at its Brackenridge, Pa., plant.

The furnace, designed and erected by Salem-Brosius, Inc., of Pittsburgh, heats slabs from 5 to 9 in. thick in lengths up to 17 ft 3 in.

Heats More Uniformly

This pusher-type furnace differs from conventional slab heaters in that heat is applied through burner ports located along the sides and at the discharge end of the furnace, rather than just through the discharge end. This makes possible faster, more uniform heating.

Slabs are charged sideways in a continuous line through the furnace chamber. As each new slab is pushed into the furnace, a conditioned slab is discharged for rolling or further processing. The furnace is 107 ft long and can be fired with either gas or oil

Methods:

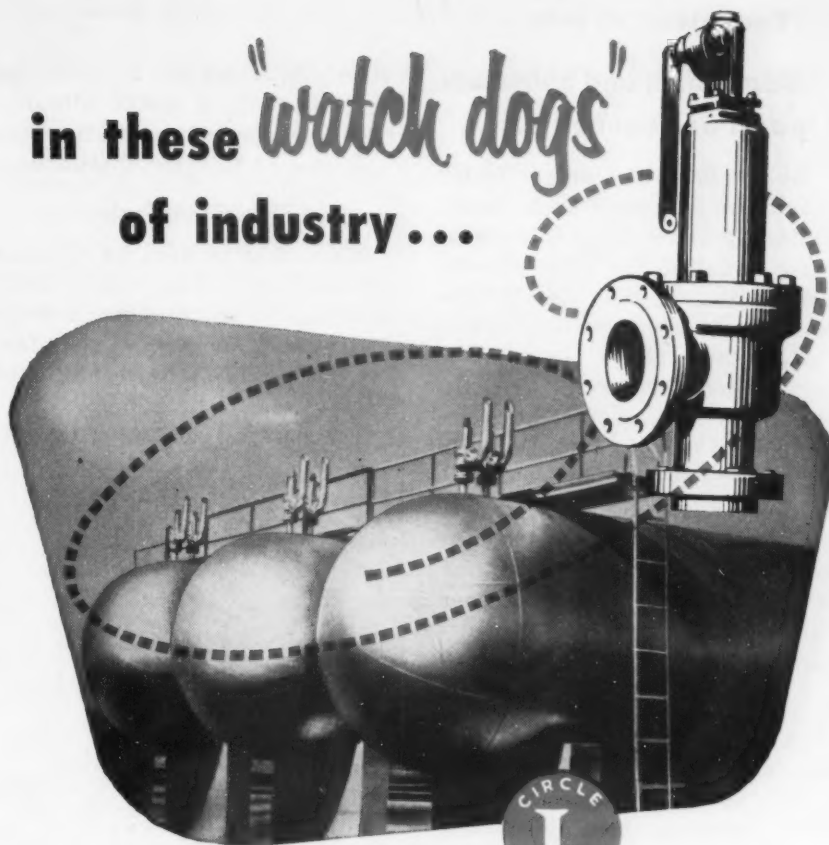
Metal adhesives used in magnesium assemblies.

Use of metal adhesives in aircraft is increasing as their advantages become better understood by designers. Thinner skins may be used in many applications with better smoothness than would be obtained with a comparable riveted structure. Fatigue resistance is increased because of the absence of stress concentrations at mechanical attachments.

Space and weight savings may result in some designs, and there may be manufacturing advantages if parts and tools are designed to take full advantage of the process.

Turn Page

in these "watch dogs"
of industry...



LEBANON STEEL Castings
are at work

SAFETY valves, those "watch dogs" of industry, are particularly important in chemical, refinery and power plants. Farris Safety and Relief Valves, for instance, are "on guard" 24 hours a day, protecting workers, protecting equipment, and assuring uninterrupted plant operations. Lebanon CIRCLE L castings, important parts of these valves, are produced in several special alloys including CIRCLE L-17*, a hardenable, corrosion-resistant, stainless steel with exceptional strength at elevated temperatures. Selecting these Lebanon casting materials added greater reliability to Safety and Relief Valves operating in lines handling steam, corrosive fluids and gases. These Safety and Relief Valves are manufactured by the Farris Engineering Corporation, Palisades Park, N. J.

Lebanon's experienced craftsmen produce castings in a wide range of materials . . . flexibility and control that provide truly dependable products.

*Lebanon's designation for Armco's 17-4-PH, produced under license by Armco Steel Corporation.

See—STEEL WITH A THOUSAND QUALITIES—37 min., 16 mm, semi-technical, full-color sound film on the making of steel castings. For information write: Dept. A, Lebanon Steel Foundry.

LEBANON Castings

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LEBANON, PA.

Magnesium and aluminum parts are bonded . .

Metal adhesives show particular promise in helicopter blade manufacture, because space limitations make it difficult to drive conventional rivets and because fatigue resistance is an important factor.

Magnesium alloys are now being bonded by several aircraft companies. Chance Vought is using bonded magnesium assemblies for some parts of their navy fighter. Boeing is using such parts in Air Force bombers. Convair has been using bonded magnesium for several years on the B-36 bomber and the RB-36 reconnaissance airplane.

Some Limitations

At present it does not appear that very much magnesium will be used on the higher speed supersonic airplanes, because, at the elevated temperatures developed by compression of the air, other materials have better strength-weight properties than available magnesium alloys for most applications.

Most bonding of magnesium has been with adhesives developed for room temperature properties and having limited strength above 160 or 180°F. So far, only very little work has been done with the application of the newer high temperature resistant adhesives to magnesium alloy.

Magnesium to Aluminum

Most of the bonded parts used by Convair are magnesium alloy assemblies. There are some cases where magnesium skin is bonded to aluminum alloy stiffeners and others where assemblies are all aluminum alloy.

Phenolic laminates are used as spacers in some assemblies. Since there are estimated to be 9000 lb of magnesium in the B-36 airframe and most of this is used as thin sheet and extrusions, it is not surprising that most of the bonding applications are in magnesium.

Some 5000 sq ft, some 25 pct of the exterior surface of the airplane, are covered with magne-

sium skin which has its stiffeners attached with a metal adhesive. There are also comparatively small numbers of interior applications.

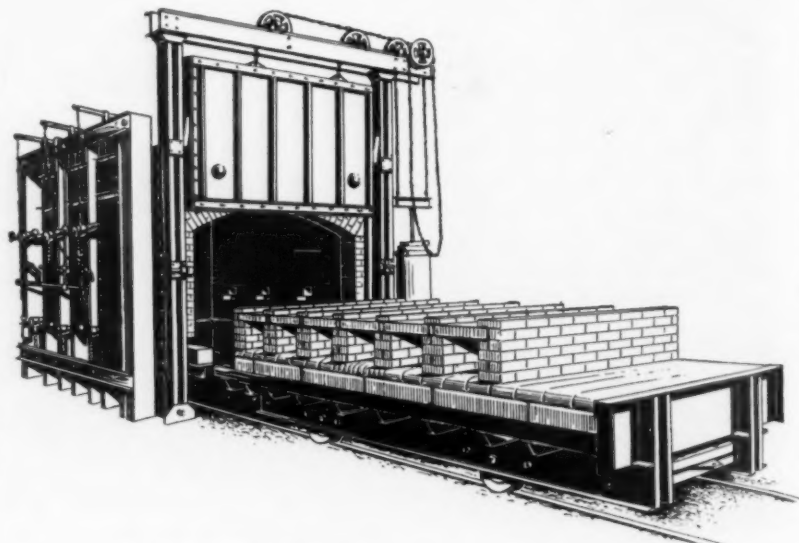
Flexible Adhesive

The adhesive used by Convair is "Metlbond." This was initially developed to the production stage by Convair. It is now manufactured and sold by Narmco, Inc. of Costa Mesa, Calif.

The material consists of two ad-

hesives, M3C and N2. It is provided in tape form with a nylon cloth carrier.

The flexible metal adhesive, M3C, forms both surface layers of the tape. This establishes a bond to metal surfaces. The interior layer is a low pressure adhesive which is thermoplastic prior to cure. This material permits comparatively low pressure bonding, because it equalizes pressures between imperfectly fitting



R-S Car Hearth Furnace showing movable hearth outside of furnace for loading of heavy materials.



R-S FURNACE TYPES

Hi-Head • Batch • Rotary Hearth • Continuous Belt Conveyor • Continuous Chain • Continuous Pusher • Continuous Pusher Tray • Pit • Continuous Roller Hearth • Car Hearth

parts or tools by flowing during the early stages of the curing operation.

Joining Formed Stiffeners

Initial extensive application of Metlbond on the B-36 was to join formed stiffener sections to thin magnesium alloy sheet, which was used as the exterior covering of the wing center section trailing edge.

These stiffeners are the "waffle

panels" which were manufactured by Dow Chemical Co. Convair has purchased more than 100,000 of these parts, which are approximately 24 x 55 in., made from 0.025 in. AZ31A-O skin. These assemblies, which were designed particularly for metal adhesive construction, proved to have excellent resistance to fatigue in an area subject to vibration because of its proximity to pusher propellers.

Proper cleaning, preparation of parts vital . . .

Satisfactory performance of this light weight structure has been responsible for the increased use of the adhesive on other assemblies, when their redesign was necessitated by some change in configuration or by previous unsatisfactory performance. Many such changes were made during the early years of the B-36 because of fatigue failures in conventional structure, caused by this vibration near the propellers, and because of other required design changes.

How to Use It

Proper cleaning and preparation of parts is the first and one of the most important steps in the bonding operation. Magnesium alloy parts to be bonded by Convair are first given the Convair anodic process known as "Manodize," followed immediately by a thin dip coat of zinc chromate primer. (Sheets are purchased with an oil coating because of the difficulty in removing a chrome pickle film.)

This completes preparation of the magnesium for the bonding operation, except that fingerprints and other soil are removed prior to application of cement by wiping all faying surfaces with a clean starch-free cheese cloth dampened with low flash naphtha. A low aromatic naphtha is used because the thin coat of primer can not be softened excessively.

Thin Coat Covers Surface

After the naphtha has been given a few minutes to evaporate, one or two thin spray coats of M3C cement are applied as a primer to all areas to be bonded, and in many cases this thin coat covers the entire surface. At least 5 minutes drying time is allowed between coats, and at least 20 minutes drying time is required after application of the final coat.

After the sprayed cement has dried, stiffening member and doublers are placed in a locating tool. Metlbond tape is then applied to all faying surfaces.

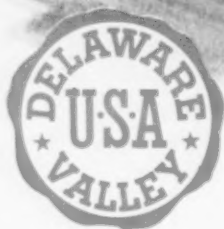
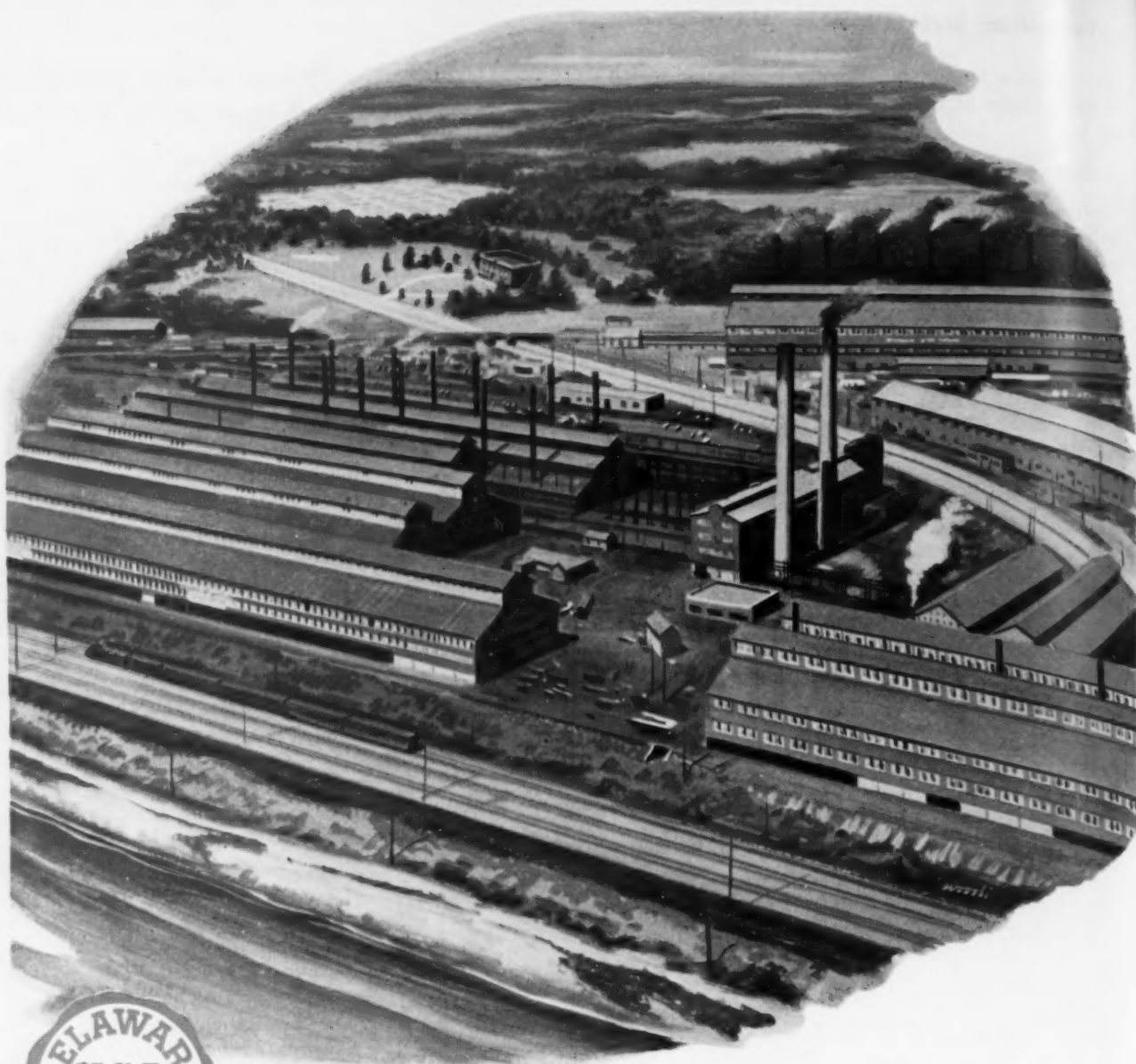
car hearth furnaces handle bulky jobs!

The R-S Car Hearth Furnace is a general purpose industrial furnace for heating heavy or bulky materials. It is used for heating metals for forging, rolling, hardening, annealing, normalizing, stress relieving and drawing. Heat source—oil, gas, or electricity. Temperature inside the furnace can range from 600 to 2500° F. Forced recirculation may be used for temperatures up to 1500° F, direct firing for temperatures from 1000 to 2500° F.

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1981

CLAYMONT STEEL

WICKWIRE SPENCER STEEL DIVISION
 THE COLORADO FUEL AND IRON CORPORATION
 CLAYMONT, DELAWARE



THE IRON AGE SUMMARY...

- ▶ Producers woo customers with low profit items
- ▶ Consumers win many concessions in new market
- ▶ Scrap skids again; ingot rate down 1 point

Some steel producers are now trying to fatten their order books by offering customers low profit items they declined to make when the market was tight. The low profit items are being offered as sugar coated inducements to consumers of more profitable products, with the hope that they will sweeten the mill's books with combination orders.

Some producers are also finding it necessary to drop extra charges that consumers formerly accepted—even though the extra processing was not needed.

Consumers report they are now able to buy a higher percentage of light plates, hot-rolled strip in lighter gages, and plain hot-rolled sheets where formerly some mills required them to take pickled and oiled sheets—whether they wanted them thus treated or not.

Some mills had discontinued or drastically reduced production of these "poor man's" items when the market was tight. But now they are glad to get even that business to keep production schedules at respectable levels.

Producer-consumer relationships are changing in other respects, too. Mills report customers are getting very persnickety on quality; rejections for quality reasons are increasing. Customers are also demanding shorter and shorter delivery. Some are now even specifying the week within the month in which they want delivery. They used to be happy if they could get delivery promise for a certain month within a quarter.

In their drive to reduce inventories and hold them at rock bottom, some steel users are going to extremes. The mills are being pressed for delivery promises faster than normal production cycles. One customer recently placed an order for sheets and requested delivery in 30 days. This can be done but it plays hob with production schedules.

Pressure to win additional concessions on freight absorption continues strong. And customers are jealous of concessions won by their competitors. Nor are they timid in stating their case for lower steel costs.

Premium prices of high cost producers have been slashed right and left. And some mills have been forced to give ground on extra charges. But regular mill base prices have not yet been seriously challenged. That will come in 1954. But steel firms will be loath to change base prices until they find out what it will cost them to sign a new wage contract. This should be known by midyear.

Placing of February orders by Ford and General Motors caused both pleasure and gloom among steel salesmen. It was stimulating to find these big customers backing their big production talk with orders. But these first February orders from the motor capital reminded steel sales people that others in the auto industry were unusually quiet. Other auto makers were still trying to chew up inventories.

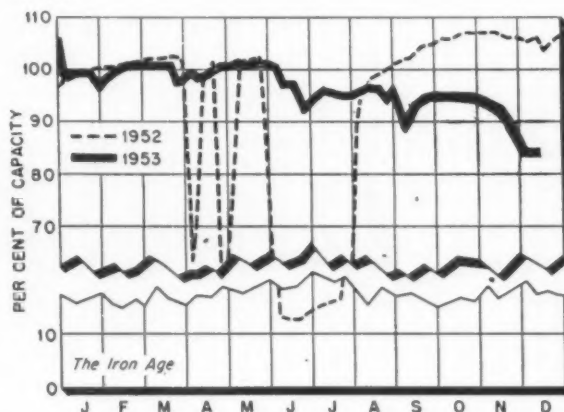
Scrap prices continue to skid in a depressed market. This week THE IRON AGE Steel Scrap Composite Price fell \$1.33 a ton to \$30.67 per gross ton. This is a new low for the year.

Steel Operating Rates

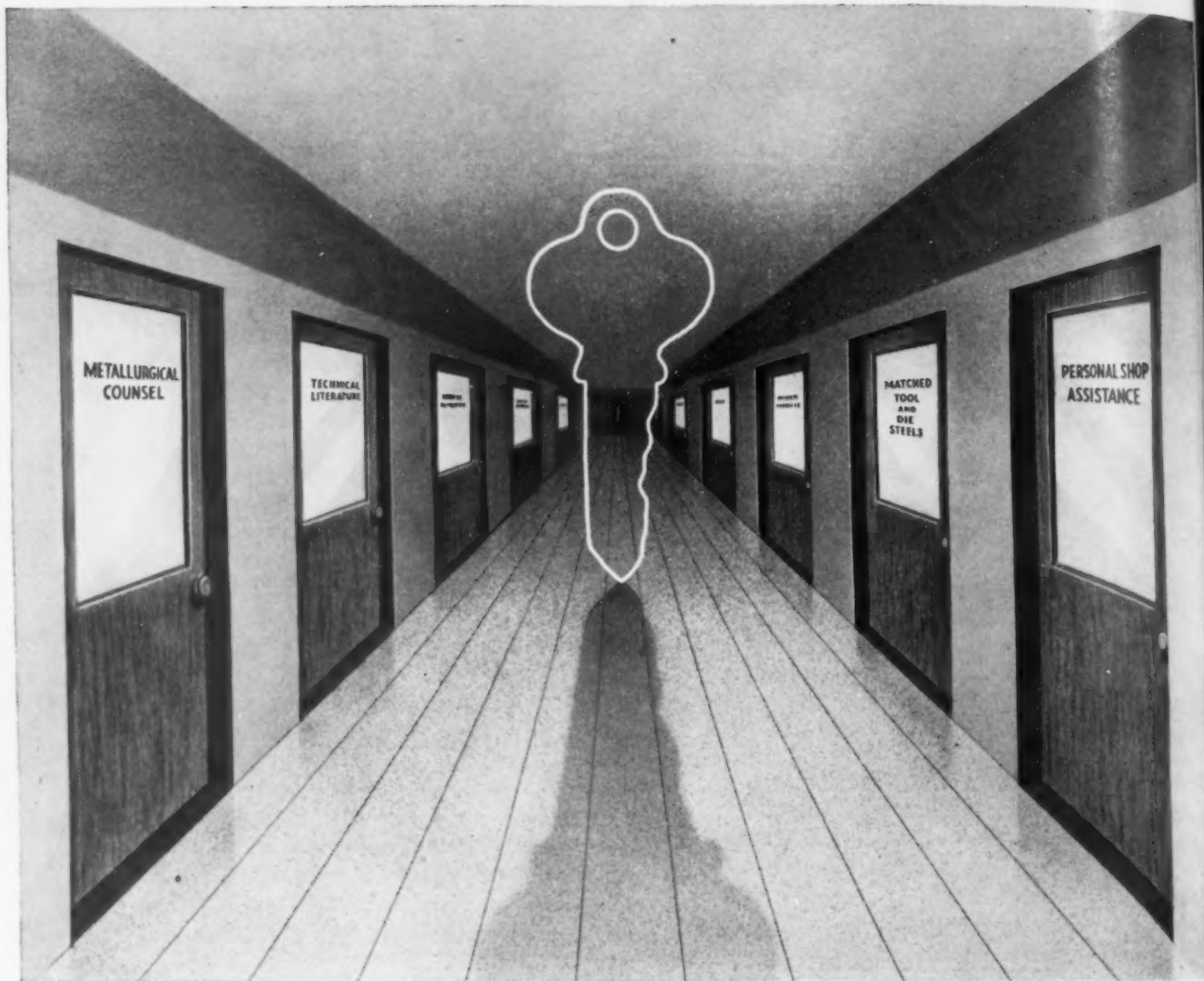
	Week of Dec. 13	Week of Dec. 6		Week of Dec. 13	Week of Dec. 6
Pittsburgh	92.0	90.0*	Detroit	88.0	86.0
Chicago	93.5	95.5*	Birmingham	96.5	96.5
Philadelphia	91.0	91.0	Wheeling	98.0	88.0*
Valley	76.0	83.0*	S. Ohio River	81.0	78.0
West	90.0	89.0*	St. Louis	88.0	83.5
Cleveland	76.5	83.0	East	90.5	87.0*
Buffalo	87.5	99.5	AGGREGATE	85.5	86.5

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,547,470 net tons.

* Revised



December 17, 1953



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most comprehensive steel services ever devised. You get quick information on prices, sizes, grades . . . personal job assistance that eases production headaches...professional Metallurgical Counsel direct from the Reading Mill . . . printed technical information that helps protect your steel investment.

Best of all, here's a service backed by a team of *specialists*—experienced

people who sincerely want your business and will do everything humanly possible to merit it.

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Markets at a Glance

Northwest Shipbuilders Busy . . . Shipyards in Washington are in the middle of a 5-year program to turn out approximately \$130 million worth of military vessels for transfer to U. S. allies. In the past 18 months the yards have delivered almost \$15 million worth of ships. Remaining \$115 million in ships are scheduled for delivery by the end of 1956.

U. S. World-Minded . . . Survey by Elmo Roper shows 73 pct of people in the U. S. believe the best way to achieve peace is through the United Nations. Only 9 pct favor strict isolationism. The study, which will appear in the next issue of Princeton University's *Public Opinion Quarterly*, was underwritten by a manufacturer of defense products who wanted to find out what Americans "can and will do that will . . . put me out of the armaments business." Other findings: 53 pct believe there will be another war within 25-30 years; 34 pct favor some form of world government; only 4 pct think we should stop building up our arms and try to appease Russia.

Taconite Plan Gets Backing . . . Erie Mining Co. has received financial support needed to construct taconite production facilities in Minnesota. Output of this taconite plant is expected to reach 7.5 million tons per year, may reach 10.5 million tons. The company arranged to sell \$207 million in bonds to nine insurance firms and Bethlehem Steel Corp. Additional capital has been subscribed by Erie's four stockholders—Bethlehem, Youngstown Sheet & Tube, Interlake Iron Corp., Steel Co. of Canada.

Brazilian Steel Build-up . . . Recent developments in Brazil indicate growing strength of that country's steel industry. Cia. Mineracao do Brazil, a large mining company, plans to build a \$10 million steel mill in Lafayette, Minas Gerais, and also reports its new seamless tube mill at Mogi das Cruzes went into production last month. Another steel mill with a capacity of 50,000 tons will be built in Vitoria by Companhia Ferro e Aco de Vitoria and the German Kloeckner iron and steel group. In addition, Volta Redonda steel company recently completed a structural steel plant with an initial capacity of 1000 tons per month.

Freight Cars Still Sliding . . . Freight car deliveries in November totaled 6137, while new orders amounted to only 2,860. Backlog on Dec. 1 was 31,869, a drop of 48,427 since the first of the year.

Good Year Ahead for Warehousemen . . . Steel distributors and warehouses can expect brisk business in 1954, says Seymour Waldman, new president, Midwest Chapter of Assn. of Steel Distributors. "The lowered state of manufacturers' raw material inventory and the tendency to purchase on a short-run basis makes for good warehouse business, since manufacturers do not want to take the inventory risk," he pointed out.

Gets Koldflo License . . . Kabel Und Metallwerke, Neumeyer of Nurnburg, Germany, has been granted a license to use the Koldflo steel process developed by Mullins Manufacturing Corp. The licensing agreement gives the German firm exclusive use of the Koldflo process and the right to grant sub-licenses to West European countries.

Will Need Less Strip . . . Atlas Steels Ltd., Welland, Ont., believes it will be able to reduce its current \$250,000 a month imports of strip steel considerably when its new strip mill goes into production early next year.

Strike Oil, Gas . . . Reynolds Mining Corp. has discovered oil and gas in Midland and Colorado Counties, Texas. Tests of the Midland oil field indicate an open flow at the rate of 1272 bbl per day, while the Colorado County gas field has an open flow of 7.2 million cu ft of natural gas, plus 26.3 barrels of condensate per million cu ft of gas.

Export Scrap . . . More than 93,000 tons of all grades of iron and steel scrap were licensed for fourth quarter export from the U. S. through Dec. 10. All but 3660 tons earmarked for Mexico were licensed for shipment to Japan.

Prices At A Glance

(cents per lb unless otherwise noted)

Composite Prices	This Week	Last Week	Last Month	Last Year
Finished Steel, base . .	4.634	4.632	4.632	4.376
Pig Iron (gross ton) .	\$56.59	\$56.59	\$56.59	\$55.26
Scrap, No. 1 hvy.				
(Gross ton)	\$30.67	\$32.00	\$35.33	\$42.00
Nonferrous Metals				
Aluminum, ingot	21.50	21.50	21.50	20.00
Copper, electrolytic . .	29.75	29.75	29.75	24.50
Lead, St. Louis	13.30	13.30	13.30	13.80
Magnesium, ingot	27.00	27.00	27.00	24.50
Nickel, electrolytic . . .	63.08	63.08	63.08	59.58
Tin, Straits, N. Y. . . .	85.50	85.75	83.00	\$1.21½
Zinc, E. St. Louis	10.00	10.00	10.00	12.50

Tin Talks Approve Market Stabilizers

Pact sets up buffer pool, floor and ceiling prices . . . Must still be ratified by participating countries . . . Copper price test taking shape . . . Scrap off—By R. L. Hatschek.

The tin market turned bullish despite the 40,000-ton U. S. stock-pile surplus hanging over it. (See THE IRON AGE, Dec. 10, p. 77). Reason was the outcome of the Geneva tin conference which approved the fixing of floor and ceiling prices as well as the establishment of a 25,000-ton buffer stock. Approved price range is 640 pounds sterling to 880 pounds sterling per ton. This is equivalent to a range of 80¢ to \$1.10 per lb.

Producing and consuming countries are grouped separately with each category having 1000 votes. Agreement will become effective upon ratification by at least nine consuming nations with a minimum of 333 votes and a number of producing countries having 900 votes.

Signatures may be affixed in London between Mar. 1 and June 30, 1954. The U. S., with its 490 consuming votes would not have to ratify the pact for it to be accepted. Malaya, Bolivia and Indonesia must.

Set Up Council . . . Administration of the buffer stock is to be by an international tin council to be set up in London. Metal will be sold when the London market

ALUMINUM SHIPMENTS

(net tons)

	Oct.	Sept.
Sheet & Plate, total . . .	50,166	50,761
Non-Heat-Treatable . . .	37,256	37,746
Heat Treatable	12,910	13,014
Foil	5,010	4,770
Extruded Products, total..	12,797	11,554
Soft Alloys	9,729	8,950
Hard Alloys	3,068	2,604
Castings, total	12,096	11,951
Sand	1,447	1,454
Permanent Mold	5,003	5,368
Die	5,641	5,130
Tube, Drawn & Welded, total	2,712	2,645
Soft Alloys	2,136	2,091
Hard Alloys	576	549
Rod & Bar, Rolled & Drawn	7,954	9,120
Wire, Bare, Not Conductor	1,685	1,533
Electric Conductor (Aluminum Content) . . .	2,424	2,920
Forgings	2,904	1,640

climbs over 800 pounds (\$1 per lb) and bought when the quotation falls below 720 pounds (90¢ per lb).

Buffer stock is to be contributed by producing countries—three-fourths in metal, one-fourth in cash. Provision is also made for establishment of export controls when the buffer stock has absorbed at least 10,000 tons or when existing market conditions make it advisable.

Price Test Takes Shape . . . Reports have it that some sales of

Chilean copper have been made at 30¢ per lb delivered Connecticut Valley. But there hasn't been any heavy impact on the domestic market as yet. Consumers want to hold off as long as possible in the hope that tonnages of Chilean copper will help trim prices.

On prices, Phelps Dodge Corp. last week announced that starting in January a uniform price will be charged for refined copper for delivery anywhere in the country. This follows the method established by Kennecott Copper Corp. a few years ago.

Scrap Slips . . . Reversing the recent trend, copper and brass scrap have eased off in price at the dealer level. This is probably the first effect of the slowly clearing Chilean picture. Ingot makers and custom smelters, however, maintained last week's prices.

Aluminum also feels easier at dealer level but quotations don't yet reflect this. Ingot makers have trimmed buying prices as well as cutting quotations on several grades of secondary ingot.

Light Metal Notes . . . Reflecting a 31-day month, primary magnesium output in October hit 6341 tons compared to 6076 tons in the preceding month. Wrought product shipments in October climbed to 705 tons from the 627-ton September figure. With production very stable since summer, it looks as if the previous prediction of 92,000 tons for 1953 will be very close.

Primary aluminum output in October declined to 108,219 tons from 109,333 tons in September. This reflects a small curtailment resulting from the power shortage in the Southeast. The weather man isn't being very rough this year (See p. 97). Aluminum production passed a real milestone in October—the 1-million ton mark. This year will be the first in history in which aluminum output tops a million tons. And the 10-month total was 1,036,086 tons.

NONFERROUS METAL PRICES

(Cents per lb except as noted)

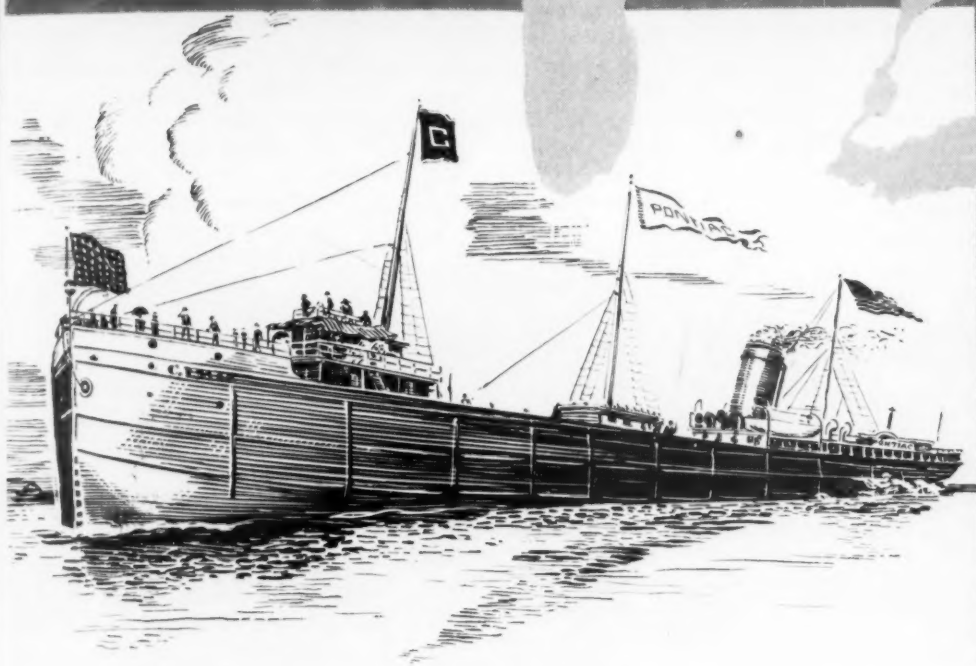
	Dec. 9	Dec. 10	Dec. 11	Dec. 12	Dec. 14	Dec. 15
Copper, electro, Conn.	29.50—	29.50—	29.50—	29.50—	29.50—	29.50—
	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake delivered	30.125	30.125	30.125	30.125	30.125	30.125
Tin, Straits, New York	86.25	86.00	85.25	85.50	85.50	85.50*
Zinc, East St. Louis	10.00	10.00	10.00	10.00	10.00	10.00
Lead, St. Louis	13.30	13.30	13.30	13.30	13.30	13.30

Note: Quotations are going prices

*Tentative

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In 1888 The Cleveland-Cliffs Iron Company built the first steel steamers for the iron ore trade, naming them the Pontiac and Frontenac. They each had a carrying capacity of 2800 tons, and the drawing above is an authentic illustration of them. From this beginning the fleet has increased to meet the growing needs of this company and today the Cleveland-Cliffs fleet numbers 19 ships. The Edward B. Greene is the flagship of the present fleet with an ore capacity of 19,700 tons.



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Prices Hit New Low for This Year

Lack of orders pushed prices further down . . . Iron Age Composite at lowest point since first half of 1950 . . . Trade sees little relief until '54, fears further dips soon.

Further price declines and almost complete lack of consumer interest characterized the scrap market in practically all areas across the country this week. THE IRON AGE Steel Scrap Composite fell \$1.33 to \$30.67—lowest point since before Korea.

Practically no one in the trade hoped for much relief before January, and some sources said business probably wouldn't improve before February. Mills in several areas just weren't interested in scrap at any price, and some were holding up shipments on material already ordered.

Slump has hit openhearth grades the hardest, but blast furnace and electric items are not unscathed. Railroad grades have also dipped, may go lower in the next week or two. Cast in most areas has managed to about hold its own.

Pittsburgh—The market declined again this week, on appraisal. Lack of consumer interest and willingness of brokers to sell at lower prices are considerations. Latest railroad lists coupled with lower asking prices for these grades are other factors. No. 1 heavy melting steel is down \$1 to \$33, top, with low phos and No. 1 railroad also declining. Blast furnace scrap and cast held steady.

Chicago—Markets were largely nominal last week in absence of any heavy movement of scrap. The few optimists who have been laying down grades were losing hope, and even bad weather was failing to revive it. Turnings traffic was particularly poor but nearly all grades were affected. Electric furnace held up comparatively well, but even this was very weak. Broker buying prices had been slipping through the week. Mills weren't interested in talking price, were turning down a variety of handsome arrangements that would have been smiled on a few weeks ago. Even

railroad grades were becoming involved in the slide, which is expected to continue well into January at least.

Philadelphia—Truck shipments of steelmaking scrap are again looming large in this contracted year-end market with a resulting wide spread in price quotations. Blast furnace material and railroad grades are quoted lower on the basis of sales and low phos is off in the almost complete absence of buying interest. Some resistance to lower openhearth prices is being felt at dealer level, but in some circles it's believed prices haven't hit bottom yet.

New York—Movement of steelmaking scrap continues virtually nil in this area. Prices are off \$2 on appraisal, and the trade complains of difficulty in selling at all. Cast movement is staying fairly good, with no price changes.

Detroit—The entire market dropped an average of \$2 on the basis of some token sales last week and attitude of scrap purchasers. There is no local buying and practically no movement out of district, causing most of the trade to predict a gloomy holiday season. A substantial tonnage of top quality automotive bundles was sold last week at about \$27.50, which would place the dealer level between \$2 and \$3 lower.

Cleveland—Not a pound of scrap is moving to mills in this area. Consumers here and in the Valley are all holding up shipments. Openhearth grades dropped \$1 on appraisal in both Youngstown and Cleveland. No. 1 railroad heavy melting went down \$2 to \$33 on the basis of recent list bidding. Very few brokers or dealers look for an improvement before February.

Birmingham—The market continues extremely dull and brokers predict this condition will prevail in the district the remainder of the year. All

southern mills were out of the market this week and give no indication when they will order again. Movement to northern markets is spotty and usually in limited quantities.

St. Louis—Last week saw only token buying by mills here by orders through brokers. Mills are cautious because of uncertainty of what the New Year will bring in orders, especially since they have large scrap inventories. Buying for January shipment is not expected until sometime between the 21st and the last of the month. Movement has been good. A producer sold 600 tons of machine shop turnings at around \$10 to a local dealer. Railroad lists closing during the week were expected to bring lower prices.

Cincinnati—Scrap prices in this area are strictly nominal. Some dealers and brokers fear drop of at least \$2 will cause further weakness in January. There was very little hope for improvement this week as brokers' buying prices slipped another \$1 across the board on appraisal.

Buffalo—The scrap market here continues weak with prices on all grades except cast off another \$1. Cast held on small sales. Leading mill consumers remain out of the market. Dealer sentiment is further depressed by expanding yard stocks, although industrial scrap collections are off an estimated 25 pct.

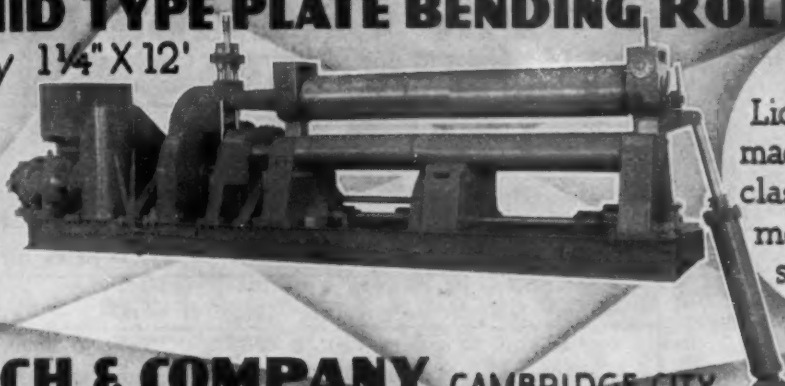
Boston—Year-end scrap buying lull continues in New England. Demand for No. 1 busheling and No. 2 bundles is so lax that prices have dropped further. Some cast items also moved downward. But a trickle of activity in most turnings grades gave a lift to prices.

West Coast—Scrap continued weak with little prospect of pickup in next 60 days. Seattle prices dropped again due to area steel producer temporarily withdrawing from market. No. 2 heavy melting dropped \$2 to \$23 there, and No. 1 bundles from \$26 to \$24.

Hamilton—The Canadian scrap trade is in the process of establishing quality differentials for openhearth grades. Prices are virtually unchanged, but THE IRON AGE now quotes in terms of the revised classifications.

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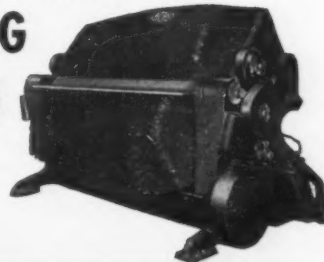
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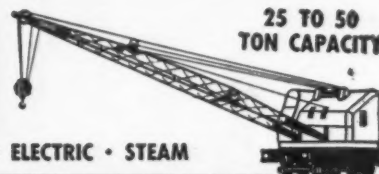
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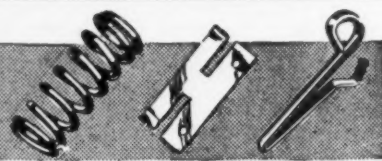
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D. C. MOTORS					
Qu.	H.P.	Make	Type	Volts	RPM
1	2200	G.E.	MCF	600	400/500
1	2000	Whse.	Mill	600	230/460
1	940	Whse.	QM	250	140/170
1	900	Whse.		250	450/550
1	825	Whse.		250	85/190
1	600	Al. Ch.		250	400/800
2	450	Whse.	CC-216	600	300/900
1	400	G.E.	MCF	550	415
2	300	Whse.	CB-5094	250	575/1150
1	200/300	G.E.	MPC	230	360/920
1	200	Rel.	1870T	230	720
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	1150
8	150	Cr. Wh.	83H-TEPC	230	960
1	150	Whse.	SK-151B	230	900/1800
1	150	Whse.	SK-201	230	360/950
1	50/120	G.E.	MCF	230	250/1000
1	100	Whse.	SK-181	230	450/1000
1	100	G.E.	CDP-115	230	1710

MILL & CRANE

1	50	G.E.	CO-1810	230	725
1	20	Whse.	K-5	230	975
4	15	Whse.	K-5	230	630
3	10	CAV.	SCM-AH	230	1150
1	10	G.E.	MD-104	230	400/800
3	6.25	Whse.	K-3	230	680
3	3	C.W.	SK-181	230	450/1000
4	3	Whse.	CDP-115	230	1750

A.C. MOTORS

3 phase—60 cycle

SLIP RING					
Qu.	H.P.	Make	Type	Volts	Speed
1	1500	G.E.	MT-498	2300	360
1	1500	ABB		2300	720
1	1200	G.E.	MT	2300	275
2	1000	A.C.	Mill	2300	240
1	500	Whse.	CW	55J	350
1	500	G.E.	1-M	2300	900
1	400	Whse.	CW	440	514
1	400	Whse.	CW-1218	2200	435
1	350	G.E.	MT-442Y	2200/4000	253
2	300	G.E.	MT-565Y	2300	900
1	250	G.E.	MT-424-Y	4000	257
1	250	G.E.	MT-5598	2200	1800
1	250	Al. Ch.		550	600
1	200	Cr. Wh.	26QB	440	505
1	200	G.E.	IM-16	440	600
1	200	G.E.	IM	440	435
1	200	G.E.	MTT	440	1170
1	150 (unused)	Whse.	CW	2300	435
1	150	G.E.	IM-16	440	600
2	125	A.C.		440	865
1	125	Al. Ch.		440	720
4	125	G.E.	MT-566Y	440/2200	435
1	100	G.E.	IM	440	600
5	100	A.C.	ANY	440	695
1	100	G.E.	IM-16	2200	435
1	100	Whse.	CW-868A	440	700

SQUIRREL CAGE

2	650	G.E.	PT-559BY	440	3570
2	450	Whse.	CS-1420	2300/4150	354
1	200	G.E.	IK-17	440	580
3	200	G.E.	KT-557	440	1800
1	150	Whse.	CS-8568	440	860
1	150	Whse.	CS	440	580
1	150/75	G.E.	IK	440 500/450	
2	125	Al. Ch.	ARW	2200	1750
1	125	Whse.	MS	440	485

SYNCHRONOUS

2	8500	G.E.	TS	2300	257
2	2100	G.E.	ATI	2300	360
2	1750	G.E.	ATI	2300	3600
2	2000	Whse.		120	
2	725	G.E.	ATI	2200/12000	600
1	450	Whse.		2200	450
2	350	G.E.	TS	2200	156

M-G Sets—3 Ph. 60 Cy.

D.C.					
Qu.	K.W.	Make	RPM	Volts	A.C.
2	2000/2400	G.E.	450	250/300	2300/4800
2	1750/2100	G.E.	514	250/300	2300/4600
1	2000	G.E.	500	250	11000
2	2000	G.E.	514	600	6600/13200
2	1500	G.E.	514	250	6600/13200
1	1500	G.E.	720	600	6600/13200
1	1500	G.E.	600	600	4160
2	1000	C.W.	514	30/115	4000/13000
2	1000	Whse.	900	360	6600
1	1000 (3U)	G.E.	900	350	2200
1	750	Whse.	900	275	4160
1	750	C.W.	514	30/115	2200
1	600	G.E.	720	250	440/2300
1	500	G.E.	720	125	2300
1	500	Whse.	900	125/250	440
1	500	Whse.	1200	125/250	2300
1	400 (3U)	Cr. Wh.	1200	125/250	2300
1	150	Whse.	1200	275	2300
1	140 (3U)	Cr. Wh.	600	125/250	440/2300
1	100	G.E.	1200	250	2300/4800
1	100	G.E.	1170	125	220/440

FREQUENCY CHANGER SETS

Qu.	KW	Make	Freq.	Voltages
1	12500	Whse.	25/60	13200/13200
1	3000	G.E.	25/60	2300/2300/4000
2	2500	G.E.	25/62.5	2200/2300
1	1000	G.E.	25/58.3	4400/2300
1	500	Al. Ch.	2560	11000/2300

BELYEA COMPANY, INC.
47 Howell Street, Jersey City 6, N. J.

The Clearing House

NEWS OF USED AND REBUILT MACHINERY

How Much Sold? . . . For the first time in the history of the industry, a fairly accurate estimate can be made of dealers' used machinery sales. Volume for 1952 was around \$215.6 million, a drop of about 18 pct from 1951 when sales hit \$263.8 million as the industry enjoyed one of its best years.

Sales during the first 6 months of '53 totaled \$120.2 million, about the same as in the first 6 months of 1952. Total volume for 1953, however, is expected to be considerably below the 1952 level of \$215.6 million. Used machinery sales usually dip during the last half of the year as plant appropriations for equipment purchases are used up, and the drop this year is expected to be even more severe than in 1952.

Have the Facts . . . THE IRON AGE obtained these figures on used machinery sales from Machinery Dealers National Assn. which has just completed its first survey in the statistical program it decided to start this year. Although the figures are close to what some dealers estimated they would be, the industry now has the facts to back up its claim that used machinery is a much larger and more important business than many people considered it to be.

Doug Williams, Williams Machinery Co., chairman of the MDNA Statistical Committee, told THE IRON AGE the industry sales estimates were based on survey replies from 85 used machinery

firms. The returns represent a good cross-section of the industry, both in terms of size and location.

Topped \$300 Million . . . Sales figures reported cover only machinery sales to users. Transactions between dealers and auction sales are not included. It is estimated, however, that if auction sales had been added, the total sales volume for 1951 would have topped the \$300 million mark.

In expanding the MDNA survey sample to get an estimate for the overall used machinery industry, it was assumed that there are only about 700 major used machinery firms in the U. S. This figure was determined from estimates by quite a few MDNA firms, based on their dealer mailing lists and similar information.

Figures Kept Secret . . . Compilation of the survey figures was carried out by the accounting firm of Ernst & Ernst in Washington, so that none of the information on individual firms was made public.

It is believed MDNA may use some of the information unearthed by this survey in the institutional advertising program it has planned for the near future. Certainly the high sales volume of the used machinery industry as pointed up by the statistical study should be a convincing argument to manufacturers who previously questioned the quality of used equipment and as result stayed out of the market.

How Much Used Machinery Do Dealers Sell?

	Sales Volume of 85 Surveyed Firms	Avg. Sales per Firm	Industry Total
1951	\$32,028,000	\$376,800	\$263,760,000
1952	\$26,177,000	\$307,965	\$215,575,500
1953 (first 6 months)	\$14,597,000	\$171,729	\$120,210,300*

*Total for all of 1953 is expected to be considerably under 1952 figure. All figures are based on survey by Machinery Dealers National Assn.